# iTrust Adapt 6kVA UPS

# User Manual

| | |
|---|---|
| Version | V1.0 |
| Revision date | |
| BOM | |

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# Safety Guidelines

## Prohibitions

1. Non-professionals are prohibited to install or commission the UPS alone.

2. As hazardous voltages are present within the UPS, only an Emerson technician or an Emerson-authorized technician is permitted to open it. Failure to observe this could result in electric shock risk and invalidation of any implied warranty.

3. Never dispose of the battery in a fire, as it may explode and jeopardize personnel safety when exposed to flame.

## Matters needing attention

1. The standard UPS has its own energy source, external battery, therefore, the output terminal of the UPS may carry live voltage even when the UPS is not connected to the AC mains.

2. Before moving or re-wiring the UPS, please disconnect the mains source and make sure the UPS is completely shut down. Or else, the output terminal may carry live voltage, thus presenting electric shock risk.

3. To ensure human safety and normal operation, the UPS must be solidly and adequately grounded before use.

4. The operating environment and save method affect the UPS lifetime and reliability. It is advisable not to use the UPS for long in the following environments:

- ●Places where the temperature and relative humidity are outside the specifications (temperature: 0°C ~ 40°C, relative humidity: 5% ~ 95%)
- ●Places in direct sunlight or near heat source
- ●Places subject to vibrations or shocks
- ●Places which are dusty, strewn with corrosive substances or salts, or where flammable gases are present

5. Please keep the air inlet and outlet unobstructed. Poor ventilation will increase the internal temperature, which will shorten the lifetime of the UPS components, hence that of the UPS.

6. Liquid and other irrelevant objects are strictly prohibited inside the UPS.

7. In case of fire, use dry chemical fire extinguisher to put out the fire. Using foam fire extinguisher may cause electric shock.

8. High ambient temperature shortens the battery lifetime. To ensure normal UPS operation and adequate autonomy time, the battery should be replaced periodically. Only Emerson-authorized technicians are permitted to replace the battery.

9. If the UPS will remain idle for a long period, it must be stored in a dry environment. The storage temperature should range between -20°C and +55°C for standard UPS (with internal battery), between -40°C and +70°C for extended UPS (with no internal battery.)

10. This equipment complies with IEC 61000-3-12 provided that the short-circuit ratio Rsce is greater than or equal to 250 at the interface point between the user’s supply and the public systerm. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit ratio Rsce greater than or equal to 250.

11. The UPS output cable must be less than 10m.

## Others

When the UPS is purchased to deliver power to the equipment listed below, please discuss with the distributor in advance about the applicability, settings, management and maintenance of the UPS, as these need special considerations during design and development.

- Life-supporting medical apparatus
- Facilities such as lifts/elevators where adequate care has to be taken to avoid any fatal eventuality endangering human life
- Any other mission-critical equipment like the above

# Contents


Chapter 1 Product Description ..... 1
1.1 Features ..... 1
1.2 Model Configuration ..... 1
1.3 Appearance And Components ..... 2
1.3.1 Appearance ..... 2
1.3.2 Components ..... 2
1.4 Operating Principle ..... 3
1.5 UPS State And Operation Mode ..... 3
1.5.1 Normal Mode ..... 3
1.5.2 Bypass Mode ..... 3
1.5.3 Battery Mode ..... 4
1.5.4 ECO Mode ..... 4
1.5.5 Fault State ..... 4
1.6 Specifications ..... 5
Chapter 2 Installation ..... 6
2.1 Unpacking Inspection ..... 6
2.2 Installation Preliminaries ..... 6
2.3 Mechanical Installation ..... 6
2.3.1 Tower Installation ..... 7
2.3.2 Rack Installation ..... 8
2.4 Connecting Cables ..... 9
2.4.1 I/O Terminal Block ..... 9
2.4.2 Connecting Input And Output Cables ..... 9
2.4.3 Connecting Battery Cables ..... 10
2.4.4 Connecting Communication Cables ..... 11
2.5 N + 1 Parallel System (Optional) ..... 12
2.5.1 Mechanical Installation ..... 12
2.5.2 Setting Parallel Addresses ..... 14
2.5.3 Connecting Parallel Cables ..... 15
2.5.4 Connecting POD Cables ..... 15
Chapter 3 Operation And Display Panel ..... 17
3.1 Control Keys ..... 17
3.2 Indicators ..... 17
3.2.1 UPS State Indicators ..... 18
3.2.2 UPS Load Battery Capacity And Fault Orientation Indicator ..... 18
Chapter 4 Operation Instructions ..... 19
4.1 Check Before Power-On ..... 19

4.2 UPS Power-On ..... 19
4.3 Turning On UPS ..... 19
4.4 Battery Self-Test ..... 20
4.4.1 Battery Power-On Self-Test ..... 20
4.4.2 Battery Manual Self-Test ..... 20
4.4.3 Battery Periodic Self-Test ..... 21
4.5 Turning Off UPS ..... 21
4.6 UPS Power-Off ..... 22
4.7 Transferring UPS Between Operation Modes ..... 22
4.7.1 Transferring UPS From Overload Protection To Bypass Mode ..... 22
4.7.2 Transferring UPS From Mains Failure To Battery mode ..... 22
4.7.3 Transferring UPS From Inner Overheating Protection To Bypass Mode ..... 23
4.7.4 Transferring UPS From Output Short Protection To Fault State ..... 23
4.8 UPS Monitoring ..... 23
Chapter 5 Maintenance And Troubleshooting ..... 24
5.1 Fan Maintenance ..... 24
5.2 Battery Maintenance ..... 24
5.3 Cleaning UPS ..... 24
5.4 Checking UPS State ..... 24
5.5 Checking UPS Functions ..... 24
5.6 Troubleshooting ..... 25
5.7 Technical Support ..... 26
Appendix 1 Battery Module ..... 27
Appendix 2 Communication Function ..... 29
Appendix 3 LCD Operation And Display Panel ..... 30
1. Brief Introduction ..... 30
2. LCD Operation And Display Interface ..... 31
Appendix 4 POD ..... 35
1. Single-Phase Input Single-Phase Output 1 + 1 POD ..... 35
2. Single-Phase Input Single-Phase Output 3 + 1 POD ..... 35
3. 3-Phase Input Single-Phase Output 3 + 1 POD ..... 36
Appendix 5 Optional Part List ..... 38

# Chapter 1 Product Description

iTrust Adapt 6kVA UPS (UPS for short) is an intelligent online UPS system with sine wave output developed by Emerson Network Power Co., Ltd. The UPS provides reliable and high quality AC power to your sophisticated equipment. The UPS adopts modular design, and rack/tower installation can be used depending on your requirements. It is applicable to supplying AC power to small scale computer center, network, communication system, automatic control system and precision instrument.

This chapter gives a brief description of the UPS, including the UPS features, model configuration, appearance, components, operating principle, state, operation mode and specifications.

## 1.1 Features

- Compatible with two input modes: 3-phase and single-phase input mode, with automatic input recognition function
- Capable of parallel connection to achieve up to 3 + 1 redundant power supply
- High-frequency double conversion topology structure, with high input power factor, wide input voltage range, and output immune to grid interference, thus adaptable to areas with unstable mains supply
- High power density
- Full digital control technology based on digital signal processor (DSP) to achieve high system reliability with self-protection and fault diagnosis
- Intelligent battery management to extend the battery life
- Operation and display panel with both LCD and LED indication to help you learn about the system operation status and operating parameters
- 2U thick. Tower installation and rack installation are optional to meet different installation requirements
- Capable of ECO mode, which saves energy to the maximum extent
- Flexible network management with Emerson monitoring software
- Fan fault self-inspection and automated diagnosing function
- SNMP card optional, providing network communication function
- Capable of connecting multiple battery strings, extending the power supply time of Battery mode

## 1.2 Model Configuration

As shown in Table 1-1, two models are available: standard model and extended model.

*Table 1-1 Model configuration*

| Model | Type | Remarks |
|---|---|---|
| Standard model | UHA1R-0050 | Configured with battery module. See *Appendix 1 Battery Module* for the structure and connection of battery module |
| Extended model | UHA1R-0050L | No battery module is configured. You need to use external battery |

# 1.3 Appearance And Components

## 1.3.1 Appearance

The UPS appearance is shown in Figure 1-1.

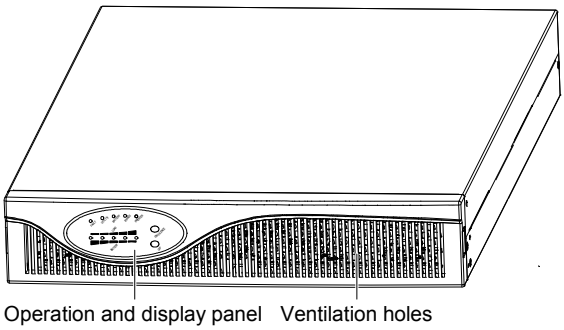



*Figure 1-1 UPS appearance*

> 🕮 **Note**
>
> Non-professionals are prohibited from opening the chassis cover. Failure to observe this could result in electric shock.

## 1.3.2 Components

**Operation and display panel**

The UPS provides an operation and display panel on the front panel. The operation and display panel provides LED indicators and control keys. For details, refer to *Chapter 3 Operation And Display Panel.*

**Rear panel**

As shown in Figure 1-2, the UPS rear panel provides parallel port, DIP switch, bypass switch, battery port, USB port, ventilation holes, SNMP card slot and I/O terminal block.

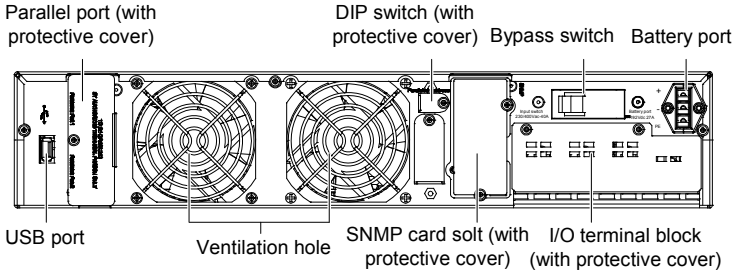



*Figure 1-2 UPS rear panel*

# 1.4 Operating Principle

The operating principle of the UPS is shown in Figure 1-3.

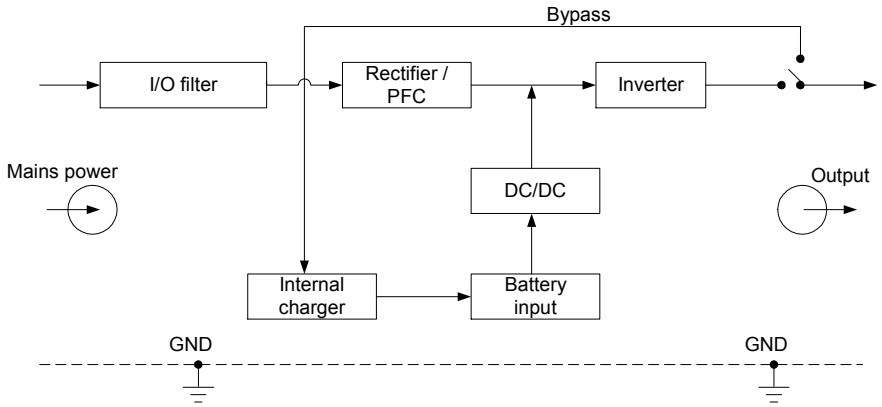



*Figure 1-3 Operating principle diagram*

1. The UPS is composed of mains input, I/O filter, rectifier/PFC, DC/DC boost, inverter, bypass, internal charger, battery input and UPS output.

2. When the mains is normal, close the bypass switch, and the internal charger will charge the battery. Before turning on the UPS, the output voltage is zero. After turning on the UPS, the electronic transfer switch connects the inverter to the load, the rectifier/PFC circuit rectifiers the mains power into DC power and feeds the DC power to the inverter. The inverter then inverts the DC power to pure sine wave AC power and feeds the AC power to the load through electronic transfer switch.

3. During mains failure, the rectifier/PFC circuit boosts the battery voltage and feeds it to the inverter. The inverter then converts it into pure sine wave AC power, and feeds the AC power to the load through electronic transfer switch.

4. After the mains recovers, the UPS will switch to Normal mode from Battery mode, the rectifier/PFC circuit rectifiers the mains power into DC power and feeds the DC power to the inverter, then electronic transfer switch feeds the DC power to the load.

# 1.5 UPS State And Operation Mode

The UPS state and operation modes include: Normal mode, Bypass mode, Battery mode, ECO mode and Fault state.

For the descriptions of indicators and control keys in this section, refer to *Chapter 3 Operation And Display Panel*.

## 1.5.1 Normal Mode

After installing the UPS, press and hold the **ON/SILENCE** key for over one second until a beep sound is heard. The UPS is started and then enters Normal mode or Battery mode.

When the mains input and output load are normal, the load is powered by the mains after processing of the inverter and the rectifier; meanwhile, the internal charger charges the battery. When the UPS is in Normal mode, the UTILITY indicator and INVERTER indicator are on.

## 1.5.2 Bypass Mode

Upon output overload or faults during the UPS operation, the UPS will switch to Bypass mode, the load is powered by the bypass AC source, which comes directly from the AC mains input; meanwhile, the internal charger charges the battery. When the UPS is in Bypass mode, the BYPASS indicator is on.

**Note**

In the event of a mains failure or mains voltage outside the specifications (120Vac ~ 253Vac) when the UPS is in Bypass mode, the UPS will cease power for the load.

### 1.5.3 Battery Mode

Upon mains failure, rectifier overload or mains voltage outside the specifications, the rectifier and internal charger will become inoperative, and the battery will power the load through the inverter. When the UPS is in Battery mode, the BATTERY indicator and INVERTER indicator are on, and the buzzer beeps every 3.3 seconds, notifying the user that the battery is powering the load.

**Note**

1. In Battery mode, when the battery voltage is low, the buzzer beeps rapidly (once per second), and the corresponding measures must be done in time.

2. The battery had been fully charged before delivery. However, storage and transportation will inevitably cause some charge loss. Therefore, it is required to charge the battery for eight hours before putting the UPS into operation, so as to ensure adequate battery autonomy.

### 1.5.4 ECO Mode

In ECO mode, when the bypass voltage is 220Vac ±10% and the frequency is within 50Hz ± 2Hz, the load is supplied by the bypass AC source and the bypass indicator is on. You can use the ECO mode to power through bypass those loads that are insensitive to power supply quality, so as to reduce the power loss.

When the bypass voltage is normal, and the inverter is in no-load state, the load is supplied by the bypass AC source and the BYPASS indicator is on.

**Note**

1. In ECO mode, if the bypass fails or bypass voltage is abnormal when the output is NOT overloaded, the UPS will switch to the Normal mode. However, if the bypass fails or bypass voltage is abnormal when the output IS overloaded, the UPS swill not switch to the Normal mode, but shut down the bypass.

2. In ECO mode, the efficiency of the UPS is up to 97%.

### 1.5.5 Fault State

Upon inverter failure or UPS over-temperature, the UPS will switch to Bypass mode when the UPS is in Normal mode, or shut down and stop the output when the UPS is in battery state. In UPS Fault state, the FAULT indicator will turn on, the buzzer will keep beeping and the corresponding indicator will blink.

**Note**

In Fault state, if the bypass fails or bypass voltage is abnormal when the output is NOT overloaded, the UPS will shut down and be powered by the inverter, such as radiator over-hot. However, if the bypass fails or bypass voltage is abnormal when the output IS overloaded, the UPS will not switch to the inverter, but shut down the bypass.

# 1.6 Specifications

The UPS specifications are listed in Table 1-2.

*Table 1-2 UPS specifications*

| Product model | | Standard UPS | Extended UPS |
|---|---|---|---|
| | | UHA1R-0050 | UHA1R-0050L |
| Input | Rated voltage | Single-phase: 220Vac, 3-phase: 380Vac | |
| | Voltage range | 176Vac ~ 276Vac, at full load<br>120Vac ~ 160Vac, linear derating<br>120Vac, at half load | |
| | Frequency | 50Hz ± 5Hz | |
| | Power factor | Single-phase: ≥ 0.99, 3-phase: ≥ 0.95 | |
| Output | Rated power | 6kVA/4.2kW | |
| | Voltage | 220Vac ± 3% | |
| | Frequency | In Normal mode: synchronizes with the bypass frequency when the bypass frequency is within 50Hz ± 5Hz<br>In Battery mode is 50Hz ± 0.2Hz<br>Bypass frequency track range is ±10% | |
| | Slew rate | 0.2Hz/s (default), 1Hz/s | |
| | Power factor | 0.7 (6kVA) | |
| | Crest factor | 3:1 | |
| | Voltage harmonic distortion | ≤ 3% (linear load), ≤ 5% (non-linear load) | |
| | Load regulation rate | 2% | |
| | Dynamic response recovery time | 60ms | |
| | Overload capacity | 105% ~ 125% rated load for 1min, 125% ~ 150% rated load for 100ms | |
| | Bypass voltage | 120Vac ~ 253Vac | |
| | Mains efficiency | 91% | |
| Battery | Type | Sealed, lead-acid, maintenance-free battery (12V/7Ah) | |
| | Cell No. | 16 | |
| | Rated voltage | 192Vdc | |
| | Recharge duration (standard UPS) | Fours hours to 90% rated capacity | Depended on external battery capacity |
| | Charge current | 2A | 4A |
| Transfer time | Normal←→Battery | 0 | |
| | Inverter←→Bypass | ≤ 4ms | |
| Noise (within 1m) | | ≤ 50dB | |
| Display | | LED/LCD (optional) | |
| Safety | | CCEE (GB4943-1995)/GB4943 | |
| EMC | Conduction emission | IEC/EN 62040-2 | |
| | Immunity | I ≤ 16A, IEC/EN61000-3-3; 16A < I ≤ 75A, IEC/EN61000-3-11 | |
| | Harmonic current | I ≤ 16A, IEC/EN61000-3-2; 16A < I ≤ 75A, IEC/EN61000-3-12<br>YD/T1095-2001 level 2 15% | |
| Surge protection | | IEC/EN-61000-4-5, endurance level 4 (4kV) (live line to earth), level 3 (2kV) (during live lines) | |
| Protection level | | IP20 | |
| Environmental condition | Operating temperature | 0°C ~ +40°C | |
| | Storage temperature | -40°C ~ +70°C (battery excluded); -20°C ~ +55°C (battery included) | |
| | Relative humidity | 5% ~ 95%, non-condensing | |
| | Altitude | < 1500m, derating in accordance with GB/T3859.2 when higher than 1500m | |
| Size | W × H × D (mm) | 430 × 88 × 630 | |
| Weight | Standard UPS (kg) | 23 | |
| | Extended UPS (kg) | 25 | |

# Chapter 2 Installation

This chapter expounds the UPS installation, including the unpacking inspection, installation notes, and installation procedures.

**Note**

The UPS installation must be carried out by professionals strictly.

## 2.1 Unpacking Inspection

Unpack the UPS and conduct the following checks:

1. Visually inspect the UPS appearance for shipping damage. If any shipping damage is founded, notify the carrier immediately.

2. Check the accessories against the delivery list. If there is any discrepancy, contact the distributor immediately.

## 2.2 Installation Preliminaries

**Notes**

The UPS is suitable for resistive-capacitive load (like computer), resistive load and micro-inductive load. It is not suitable for purely inductive load or purely capacitive load (like motor, air-conditioner and duplicator), nor can it be connected to half-wave rectifier load.

**Installation environment**

1. Do not install the UPS outdoors. The installation environment should meet the specifications (see Table 1-2).

2. Install the UPS in an environment with good ventilation and free of dust, volatile gas, salt, and corrosive materials. Keep the UPS far away from water, heat source, flammables and explosive substances. Avoid direct sunlight.

**Installation clearances**

Maintain a clearance of at least 200mm at both sides and back of the UPS. Keep the air inlets unobstructed on the front panel and rear panel of the UPS to facilitate ventilation and heat dissipation. Otherwise, the UPS internal temperature will rise, which will shorten the lifetime of the UPS.

**Installation tools**

Prepare installation tools according to Table 2-1. The tools must be insulated and ESD-proof processed before they are used.

*Table 2-1 Installation tools*

| Installation tool | Specification | Application |
|---|---|---|
| Cross screwdriver | EJ5100mm | Remove the UPS top plate, or open the chassis |
| Wire-pressure plier | YT-12 | Press wires for I/O terminal block |
| Diagonal plier | MTC3C | Make input and output connection cables |
| Small slotted screwdriver | EJ375mm | Connect input and output cables |

## 2.3 Mechanical Installation

Two installation modes are available: tower installation and rack installation. You can select an appropriate installation mode according to the actual conditions.

### 2.3.1 Tower Installation

**Note**

Various installation configurations are available: single UPS, single UPS with single- or multiple-battery. Their installation methods are all the same.

Installation method:

1. Take out support bases from the accessories, and snap them up in the direction shown in Figure 2-1, and then put the support bases down on the installation surface flatwise.

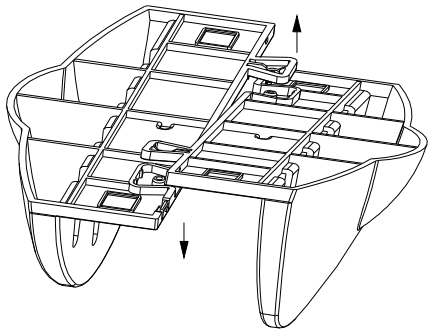


*Figure 2-1 Installing support base (top view)*

2. If battery module installation is necessary, take out a support base extension delivered with the battery module, and then assemble the support base extension and the support bases through fastenings, as shown in Figure 2-2.

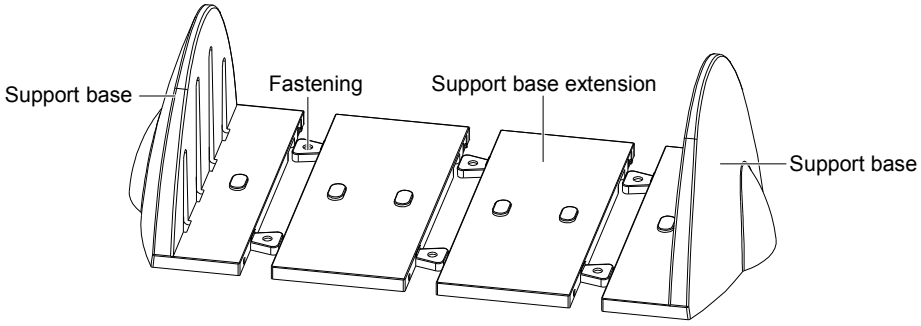



*Figure 2-2 Installing support base with support base extension (front view)*

3. Place the UPS on the support bases. Each UPS needs four support bases to install, as shown in Figure 2-3.

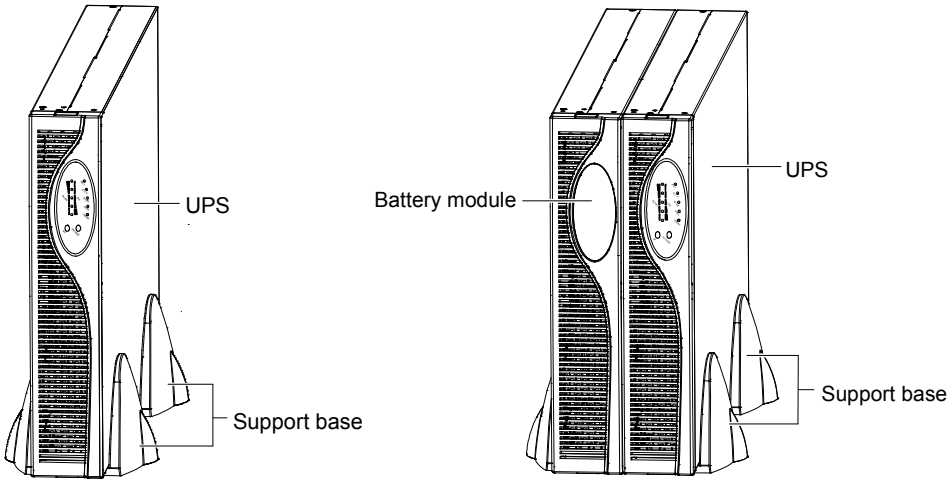



*Figure 2-3 Tower installation*

## 2.3.2 Rack Installation

**Note**

1. Various installation configurations are available: single UPS, single UPS with single or multiple-battery. Their installation methods are all the same.

2. Because battery modules are too heavy, two or more installation personnel are required to install them at the same time. Please install them from bottom to top.

Rack installation: fix the UPS and battery module onto the rack through brackets.

Installation method:

1. Take out two brackets and six M4 * 10 screws from the accessories, and fix the brackets onto the battery module using the screws through installation holes, as shown in Figure 2-4.

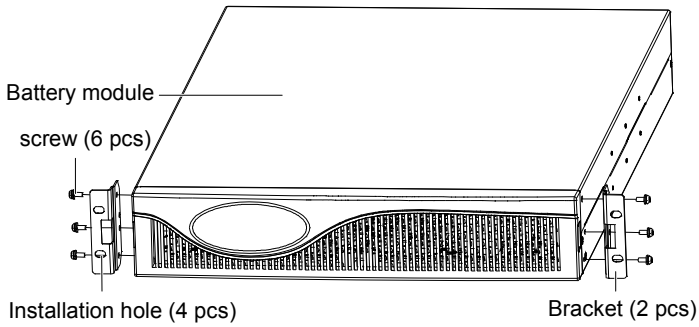



*Figure 2-4 Installing bracket*

2. Place the battery module onto guide rail in the rack, and push it completely into the rack along the guide rail (it is prohibited to place the battery module through the brackets). Take out four M6 * 16 screws from accessories, and fix the battery module onto the rack using the screws through the installation holes on the racket, as shown in Figure 2-5.

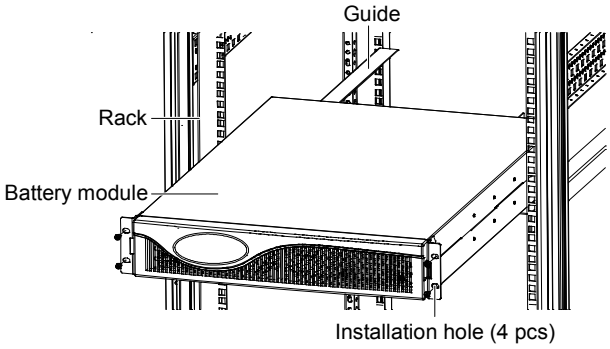



*Figure 2-5 Installing battery module*

3. The installation method of the UPS is the same as that of the battery module. Install the UPS on top of the battery module. The rack installation method of standard UPS with single UPS and single battery module is shown in Figure 2-6.

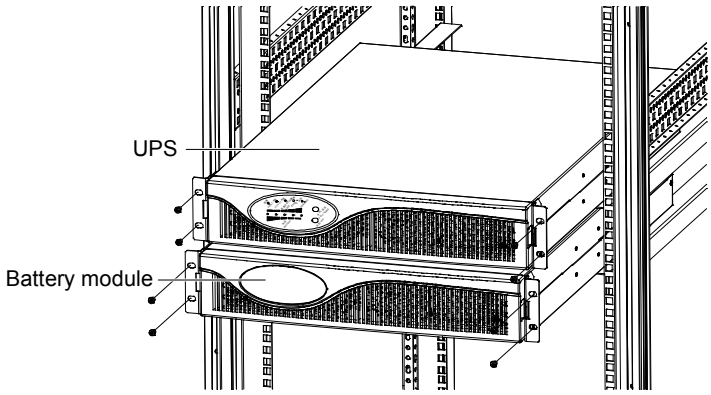



*Figure 2-6 Rack installation of standard UPS with single UPS and single battery module*

# 2.4 Connecting Cables

UPS is applicable to the TN and TT power distribution system.

UPS cables include input and output cables (prepared by yourself) and battery cables (delivered with battery module).

Input cables and output cables should be at least 10AWG or 6mm2 copper wires. Tube cable lugs must be added to all cables to ensure reliable connection.

## 2.4.1 I/O Terminal Block

The UPS provides an I/O terminal block (see Figure 1-2) on the rear panel for the connection of the UPS input cables and output cables. Remove the protective cover to get access to the I/O terminal block when connecting. Its terminals are shown in Figure 2-7.

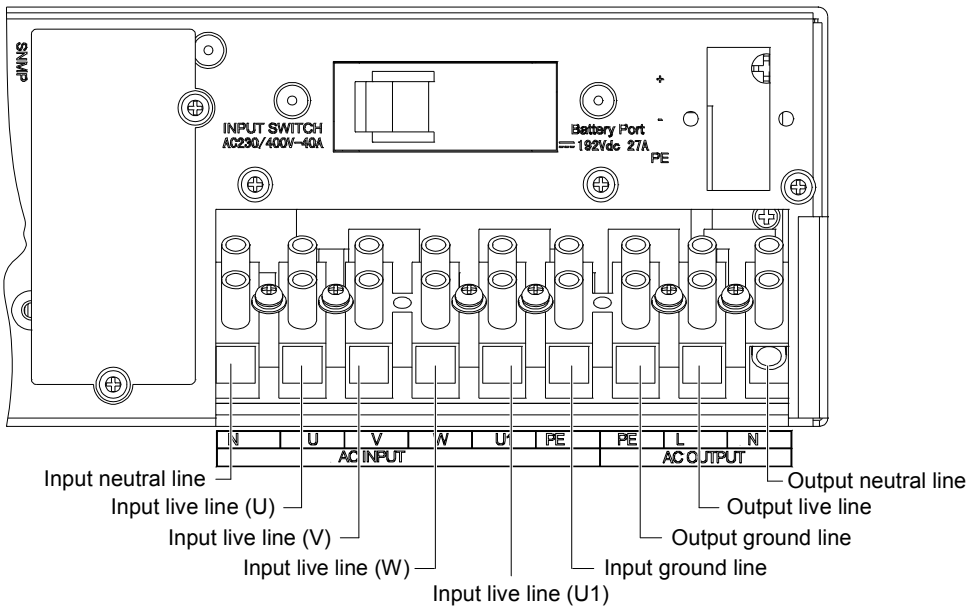



*Figure 2-7 I/O terminal block*

## 2.4.2 Connecting Input And Output Cables

**Notes**

1. Do not reverse the input neutral line and live line!

2. Do not use a wall socket to feed power to the UPS. Otherwise, the socket may be burned.

3. Connect the output neutral line, live line and ground line correctly and reliably. For the sake of safety, the output ground line must be connected before the output neutral line and live line.

4. Install a quadrupole linkage breaker on the mains input neutral line and live line to facilitate cutting power under emergency conditions. Adopt correct power distribution method to ensure safety of the UPS and loads.

Correct power distribution method is shown in Figure 2-8.

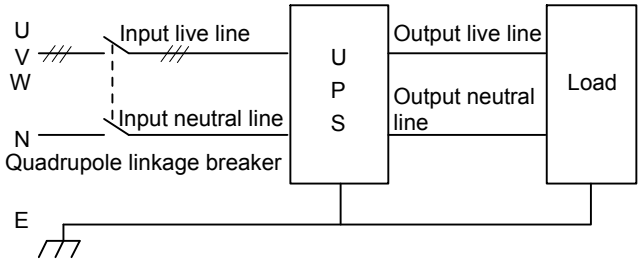



*Figure 2-8 Correct power distribution method*

Wrong power distribution method is shown in Figure 2-9.

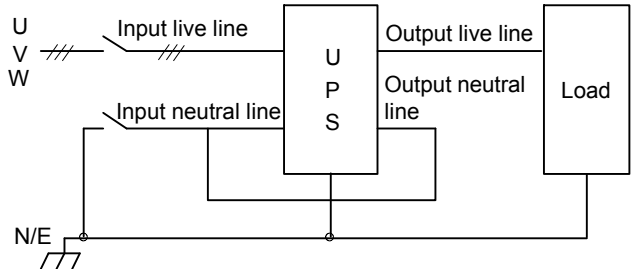



*Figure 2-9 Wrong power distribution method*

Connection Procedures

1. Confirm that all UPS input switches and output switches are open.

2. Remove the protective cover of the I/O terminal block.

3. Connect the mains input neutral line, live line (U, V, W) and ground line to the input neutral line terminal, live line terminal (U), live line terminal (V), live line terminal (W) and ground line terminal on the UPS I/O terminal block respectively when the mains input is 3-phase, and tighten the fixing screws. Connect the mains input neutral line, live line (U) and ground line to the input neutral line terminal, live line terminal (U) and ground line terminal on the UPS I/O terminal block respectively when the mains input is single-phase, and tighten the fixing screws.

4. Connect the UPS output cables (live line, neutral line, ground line) to the output terminals (live line terminal, neutral line terminal, ground line terminal) on the UPS I/O terminal block, and tighten the fixing screws.

5. Connect the other end of the UPS output cables (live line, neutral line, ground line) to the load.

6. Refit the protective cover of the UPS I/O terminal block.

🕮 **Note**

1. The mains input is single-phase in factory. Disconnect the external lines (line No.: W19) of the input live lines (U, V, W), and connect all mains input live lines to the input neutral line terminal, input live line terminal (U), input live line terminal (V), input live line terminal (W) and input ground line terminal on the UPS I/O terminal block, so as to change the mains input to 3-phase input.

2. Use MCB at the UPS input and output ends to facilitate cutting power and loads at emergency conditions. It is recommended to use 63A MCB at the input end and 40A AC MCB at the output end.

3. After connecting input and output cables, refit the protective cover of the I/O terminal block and fasten the input and output cables with cable ties, so as to prevent electric shock.

## 2.4.3 Connecting Battery Cables

Before connecting the battery module, check that

1. The battery string comprises batteries of the same manufacturer, same model, and same use state.

2. The battery module number complies with the UPS specifications, that is, sixteen 12V batteries are connected in series.

3. The battery string voltage is about 200Vdc after series connected.

Battery cable connection includes: connecting battery cables of standard UPS and connecting battery cables of extended UPS.

**Connecting battery cables of standard UPS**

Connection procedures:

1. Confirm that all UPS input switches and output switches are open.

2. Confirm with a voltmeter that no voltage is present at the battery ports on the rear panel.

3. Take out a battery cable from accessories of the battery module. Connect one end of battery cable to the battery port on the rear panel of the UPS, and connect the other end to any battery ports (two in all) on the rear panel of the battery module.

The battery cable connection of standard UPS is shown in Figure 2-10.

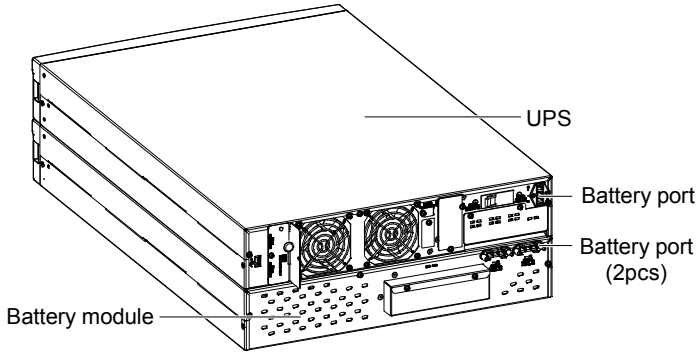



*Figure 2-10 Battery cable connection of standard UPS*

**Note**

1. It is prohibited to reverse the positive pole and negative pole of the battery.

2. Different UPS cannot use the same battery module. Otherwise, the UPS will be damaged.

3. The length of the battery cable configured with standard UPS is 0.5m. If you prepare battery cables by yourself, make the cables between the battery module and UPS as short as possible.

**Connecting battery cables of extended UPS**

**Note**

1. Before replacing the battery module and connecting battery cables, turn off the UPS.

2. Do not reverse the battery module when replacing the battery module on line.

3. Because the battery has dangerous energy, non-professionals are prohibited from connecting cables of battery for the extended UPS.

4. The length of external battery cables for the extended UPS is 1.5m. If you need more length cables, please consult with your dealer. It is recommended that the battery cable be shorter than 3m. Otherwise, the UPS cannot operate normally.

Connection procedures:

1. Switch off the input switch of the external battery module.

2. Take out one battery cable, whose one end is PP45 plug and the other end is three OT terminals.

3. Connect the red line, black line and yellow line of the OT terminal to the positive pole, negative pole and ground line of the battery input switch respectively. If the OT terminal is not matched with connection terminals of the battery input switch, cut the OT terminal and peel appropriate length of copper core and then connect it to the battery input switch.

4. Insert the PP45 plug to the battery port on the rear panel of the UPS.

### 2.4.4 Connecting Communication Cables

Communication cable connection includes: connecting USB communication cables and connecting SNMP card communication cables.

**Connecting USB communication cables**

1. Take out USB communication cables from accessories of the UPS.

2. Insert one end of the USB communication cable to the USB port on the rear panel of the UPS (see Figure 1-2).

3. Insert the other end of the USB communication cable to the USB port of the computer.

**Connecting SNMP card communication cables**

Through the optional SNMP card, users can access the UPS operation state and information using background monitoring software delivered with SNMP card.

The installation and communication cable connection of the SNMP card are as follows:

1. Remove the protective cover of the SNMP card, as shown in Figure 2-11 (a). Take care of the protective cover for future use.
2. Insert the SNMP card to the SNMP card slot and fasten it with screws, as shown in Figure 2-11 (b).
3. Connect the UPS to computer network port with network cables (prepared by users).
4. For the setting and use of the SNMP card, refer to *UPS Web/SNMP Agent Card User Manual*.

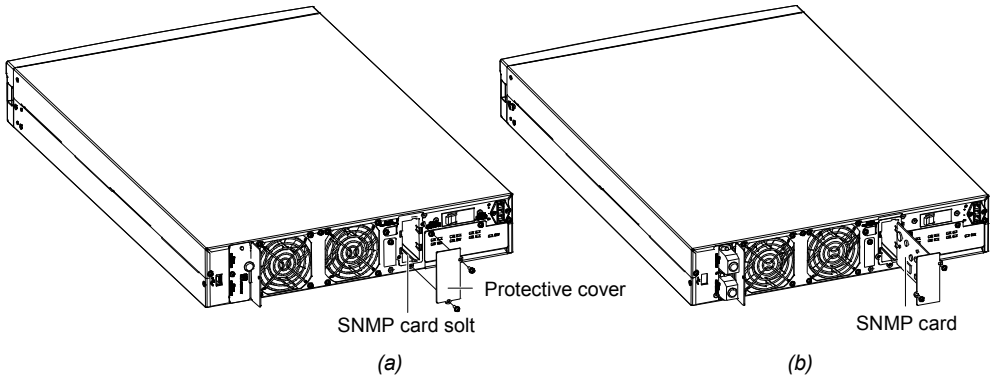



*Figure 2-11 Installing SNMP card*

After the installation, find the label shown in Figure 2-12 on the enclosure of the UPS and click " √ " before "AC INPUT" according to the actual situation for easy maintenance.

*Figure 2-12 Label*

## 2.5 N + 1 Parallel System (Optional)

The UPS parallel system provides three parallel systems: single-phase input single-phase output 1 + 1 parallel system, single-phase input single-phase output 3 + 1 parallel system and 3-phase input single-phase output 3 + 1 parallel system.

UPS parallel output power distribution unit (POD for short) is an option of the UPS parallel system, which can provide safe and reliable power distribution function. POD includes single-phase input single-phase output 1 + 1 POD, single-phase input single-phase output 3 + 1 POD and 3-phase input single-phase output 3 + 1 POD.

Installing parallel system includes:

- Mechanical installation
- Setting parallel addresses
- Connecting parallel cables
- Connecting POD cables

### 2.5.1 Mechanical Installation

Taking rack UPS parallel system installation as an example, the installation method of the N+1 parallel system is as follows:

- Installing POD
- Installing UPS
- Installing battery module

The installation methods of the POD and battery module are the same as that of the UPS. For details, refer to *2.3.2 Rack Installation*.

The installation diagram of the single-phase input single-phase output 1 + 1 parallel system excluding battery module is shown in Figure 2-13.

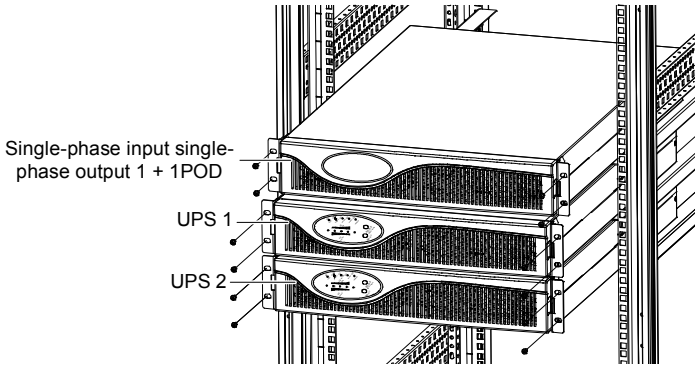



*Figure 2-13 Installation diagram of the single-phase input single-phase output 1 + 1 parallel system excluding battery module*

The installation diagram of the single-phase input single-phase output 1 + 1 parallel system including battery module is shown in Figure 2-14.

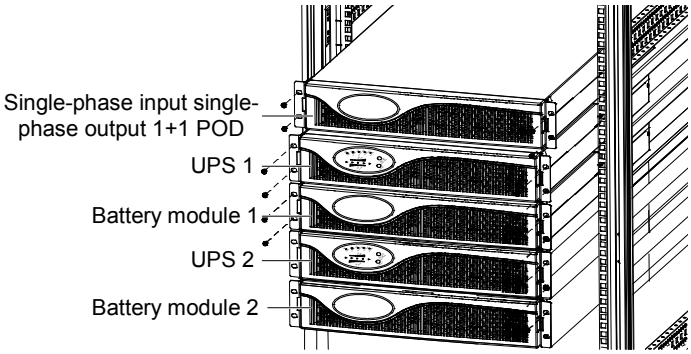



*Figure 2-14 Installation diagram of the single-phase input single-phase output 1 + 1 parallel system including battery module*

**Note**

1. Two UPSs cannot share one battery module. Otherwise, the UPS will be damaged.
2. The POD must be installed on the top of the UPS to facilitate cable connection and operation.

The installation diagram of the 3-phase input single-phase output 3 + 1 parallel system and single-phase input single-phase output 3 + 1 parallel system excluding battery module is shown in Figure 2-15.

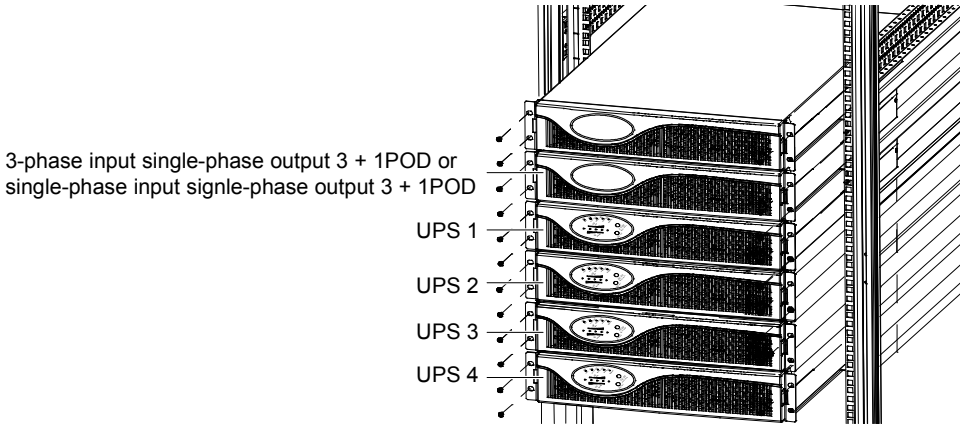



*Figure 2-15 Installation diagram of the 3+1 parallel system excluding battery module*

The installation diagram of the 3-phase input single-phase output 3 + 1 parallel system and single-phase input single-phase output 3 + 1 parallel system including battery module is shown in Figure 2-16.

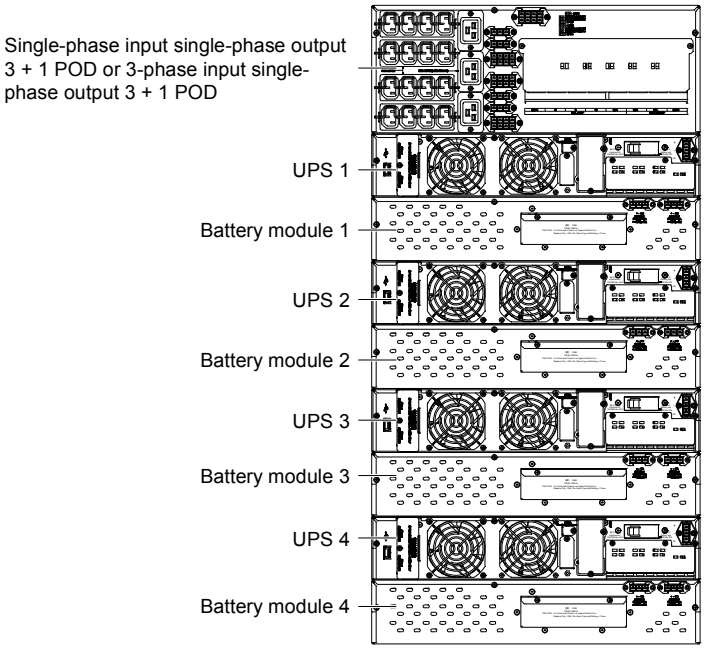

Single-phase input single-phase output 3 + 1 POD or 3-phase input single-phase output 3 + 1 POD
UPS 1
Battery module 1
UPS 2
Battery module 2
UPS 3
Battery module 3
UPS 4
Battery module 4

*Figure 2-16 Installation diagram of the 3 + 1 parallel system excluding battery module*

**Note**

Only professionals are allowed to install parallel system!

## 2.5.2 Setting Parallel Addresses

For single-phase input single-phase output 1 + 1 parallel system, single-phase input single-phase output 3+1 parallel system and 3-phase input single-phase output 3 + 1 parallel system, the parallel addresses must be set when paralleling.

Set the parallel addresses through DIP switch on the rear panel of the UPS, as shown in Figure 1-2.

Through DIP switch, the UPS can be set to single mode or parallel mode. The UPS is set to single mode in factory. In single mode, all bits of the DIP switch are placed to OFF positions.

Remove the protective cover of the DIP switch, whose amplified view is shown in Figure 2-17.

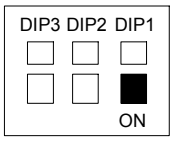
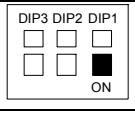
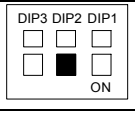
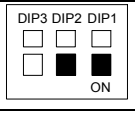
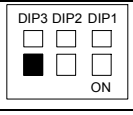



*Figure 2-17 DIP switch*

The setting list of the DIP switch for parallel address is given in Table 2-2.

*Table 2-2 Setting of the DIP switch for parallel address*

| Parallel address / DIP | Parallel 1# | Parallel 2# | Parallel 3# | Parallel 4# |
|---|---|---|---|---|
| DIP switch position |  |  |  |  |



**Note**

1. For single-phase input single-phase output 1 + 1 parallel system, the host and slave should be generated through the competition.

2. For single-phase input single-phase output 3 + 1 parallel system and 3-phase input single-phase output 3 + 1 parallel system, set the UPS according to Table 2-2.

3. Only Emerson-authorized technicians are allowed to operate DIP switch. Otherwise, the UPS may be damaged.

## 2.5.3 Connecting Parallel Cables

The UPS provides parallel ports on the rear panel, as shown in Figure 1-2. Parallel cables are accessories of the POD. Follow Figure 2-188 to connect parallel cables.

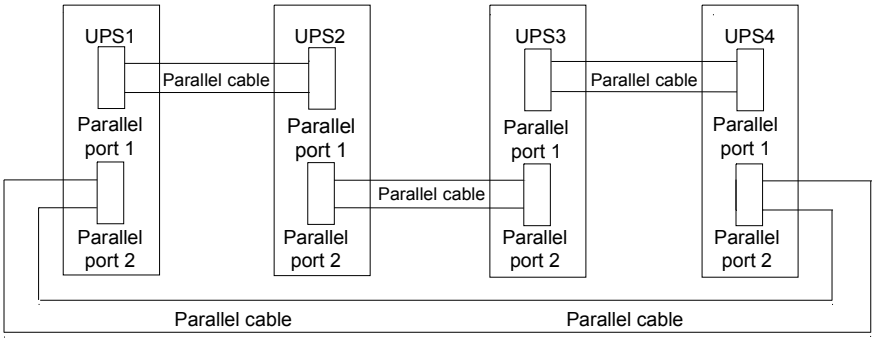



*Figure 2-18 N + 1 parallel cable connection diagram*

## 2.5.4 Connecting POD Cables

Connecting POD cables includes: connecting cables between the UPS and POD and connecting input and output cables of the POD.

For POD ports, refer to *Appendix 4 POD.*

**Connecting cables between the UPS and POD**

The connection methods are as follows:

Take out cables from the package of the POD, and connect cables between the UPS and POD according to Table 2-3, Table 2-4 and Table 2-5.

*Table 2-3 Cable connection between the POD and UPS*

| POD | UPS |
|---|---|
| Insert the accessory cables marked with UPSn to input and output ports of the UPSn (n represents 1, 2, 3, 4) | I/O terminal block |

*Table 2-4 Connecting accessory cables to I/O terminal block of UPS (single-phase input single-phase output 1+1 POD and 3＋1 POD)*

| Mark of accessory cable | Silk-print of I/O terminal block of the UPS |
|---|---|
| Input -PE | AC INPUT PE |
| Input -N | AC INPUT N |
| Input -L | AC INPUT U |
| Output -L | AC OUTPUT L |
| Output -N | AC OUTPUT N |
| Output -PE | AC OUTPUT PE |

*Table 2-5 Connecting accessory cables to I/O terminal block of UPS (3-phase input single-phase output 3 + 1 POD)*

| Mark of accessory cable | Silk-print of I/O terminal block of the UPS |
|---|---|
| Input -PE | AC INPUT PE |
| Input -N | AC INPUT N |
| Input -U | AC INPUT U |
| Input -V | AC INPUT V |
| Input -W | AC INPUT W |
| Output -PE | AC OUTPUT PE |
| Output -L | AC OUTPUT L |
| Output -N | AC OUTPUT N |

**Note**

When connecting cables, connect the UPS end at first, and then connect the POD end.

**Connecting input and output cables of the POD**

Connection procedures:

1. For 3-phase input single-phase output 3 + 1 POD, connect the mains input cables (U, V, W, N, PE) to the corresponding terminals on the I/O terminal block of the POD respectively.

2. For single-phase input single-phase output 1 + 1 POD and single-phase input single-phase output 3 + 1 POD, connect the mains input cables (L, N, PE) to the corresponding terminals on the I/O terminal block of the POD respectively.

The connection procedures of the POD output cables are as follows:

1. The POD output ports includes: 10A socket, 16A socket and output terminals of the I/O terminal block on the rear panel of the POD. User can select output ports to connect output cables according to actual conditions.

2. Connect the other end of the output cable to the load.

**Note**

1. A protective MCB must be series connected between the POD and the mains. It is recommended to use 63A MCB in single-phase input single-phase output 1 + 1 POD and 125A 3-phase or single-phase MCB in single-phase input single-phase output 3 + 1 POD.

2. Confirm reliable connection for the ground line.

3. When you need to turn off the UPS in the parallel system, press the **OFF** key on the corresponding UPS firstly to cut off the output of the UPS, and then open the input and output MCBs of the corresponding POD.

# Chapter 3 Operation And Display Panel

This chapter introduces the control keys and indicators of the operation and display panel.

The operation and display panel is located on the front panel of the UPS (see Figure 1-1), which provides two control keys and ten indicators, as shown in Figure 3-1.

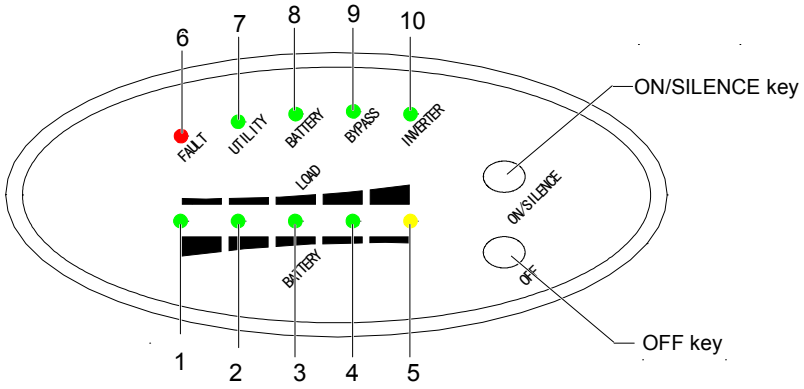



*Figure 3-1 Operation and display panel*

## 3.1 Control Keys

The operation and display panel provides two control keys: **ON/SILENCE** key and **OFF** key. Their functions are given in Table 3-1.

*Table 3-1 Functions of control keys*

| Control key | Function |
|---|---|
| **ON/SILENCE** key | 1. Starting inverter: When the inverter is off, pressing and holding this key for one second starts the inverter. 2. Silencing alarm: In Battery mode, or upon overload or fault, the UPS has an audible alarm, pressing and holding this key for one second silences the alarm. 3. Initiating battery test: When the UPS is in Normal mode, pressing and holding this key for four seconds initiates battery test |
| **OFF** key | 1. Turning off inverter: When the UPS is in Normal mode or Battery mode, pressing and holding this key for one second turns off the inverter. 2. UPS accessing to standby state: When the UPS is in Bypass mode, pressing and holding this key for ten seconds turns off UPS bypass output, then the UPS accesses to standby state |

📖 **Note**

Pressing and holding the **ON/SILENCE** key for one second silences the alarm, and do the same operation can resume the alarm beep.

## 3.2 Indicators

The operation and display panel provides ten indicators, which can be divided into two groups according to the applications.

- UPS state indicators

The indicators include five indictors: FAULT indicator, UTILITY indicator, BATTERY indicator, BYPASS indicator and INVERTER indicator. The FAULT indicator is red and the other indicators are green.

- UPS load battery capacity and fault orientation indicator

Load state, battery remaining capacity display or fault orientation indicator, includes five indicators, of which four indictors are green and one indicator is yellow. The yellow indicator indicates UPS load over-capacity or battery capacity too-low.

### 3.2.1 UPS State Indicators

UPS state indicators (see Figure 3-1) indicate the UPS operation and fault state, as described in Table 3-2.

*Table 3-2 LED indicator description*

| Indicator No. | Definition | Color | Description |
|---|---|---|---|
| 6 | FAULT indicator | Red | On in the event of fault, and off otherwise |
| 7 | UTILITY indicator | Green | On when the mains is normal, off during mains failure, and flashes when mains voltage outside specifications |
| 8 | BATTERY indicator | Green | On when the battery is supplying power, and off otherwise |
| 9 | BYPASS indicator | Green | On when the bypass is supplying power, and off otherwise |
| 10 | INVERTER indicator | Green | On when the inverter is supplying power, and off otherwise |

### 3.2.2 UPS Load Battery Capacity And Fault Orientation Indicator

The UPS load battery capacity and fault orientation indicator indicates the load situation of the UPS. In Battery mode, it indicates battery capacity. Upon UPS failure, it works with the UPS state indicators to indicate the fault type of the UPS.

Ten indicators cooperate to indicate the operation state and fault type of the UPS, as described in Table 3-3.

*Table 3-3 Indicators combining to indicate the fault type of the UPS*

| No. | Operation state | | Indicator No. (see Figure 3-1) | | | | | | | | | | Alarm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| 1 | Normal mode | 5% ~ 25% load capacity | ● | | | | | | ● | | | ● | |
| 2 | | 26% ~ 50% load capacity | ● | ● | | | | | ● | | | ● | |
| 3 | | 51% ~ 75% load capacity | ● | ● | ● | | | | ● | | | ● | |
| 4 | | 76%~ 95% load capacity | ● | ● | ● | ● | | | ● | | | ● | |
| 5 | | 96% ~ 105% load capacity | ● | ● | ● | ● | ● | | ● | | | ● | |
| 6 | | > 105% load capacity | ● | ● | ● | ● | ● | | ● | | | ● | ☐2Hz |
| 7 | Battery mode | 0% ~ 25% battery capacity | | | | | ● | | | ● | | ● | ☐1Hz |
| 8 | | 26% ~ 50% battery capacity | | | | ● | | | | ● | | ● | ☐1/3Hz |
| 9 | | 51% ~ 75% battery capacity | | | ● | ● | | | | ● | | ● | ☐1/3Hz |
| 10 | | 76% ~ 95% battery capacity | | ● | ● | ● | | | | ● | | ● | ☐1/3Hz |
| 11 | | < 96% battery capacity | ● | ● | ● | ● | | | | ● | | ● | ☐1/3Hz |
| 12 | Bypass mode | < 105% load capacity | ◎ | ◎ | ◎ | ◎ | ◎ | | ● | | ● | | |
| 13 | | > 105% load capacity | ● | ● | ● | ● | ● | | ● | | ● | | ☐2Hz |
| 14 | Inverter standby | < 105% load capacity | ◎ | ◎ | ◎ | ◎ | ◎ | | ● | | ● | ¤ | |
| 15 | | > 105% load capacity | ● | ● | ● | ● | ● | | ● | | ● | ¤ | ☐2Hz |
| 16 | Non-operation mode | | | | | | | | ◎ | | | | |
| 17 | Short fault | | | | | | ¤ | ● | | | | | ◇ |
| 18 | Charger failure | | | | | ¤ | | ● | ◎ | ◎ | ◎ | ◎ | ◇ |
| 19 | fan/over-temperature fault | | | | ¤ | | | ● | ◎ | ◎ | ◎ | ◎ | ◇ |
| 20 | Parallel current sharing failure | | | ¤ | | | | ● | ◎ | ◎ | ◎ | ◎ | ◇ |
| 21 | Rectifier failure (bus high fault) | | ¤ | | | | | ● | ◎ | ◎ | ◎ | ◎ | ◇ |
| 22 | Battery fault (high voltage) | | ◎ | ◎ | ◎ | ◎ | ◎ | | ◎ | ¤ | ◎ | ◎ | |
| 23 | Battery fault (no battery, reverse connection) | | ◎ | ◎ | ◎ | ◎ | ◎ | ● | ◎ | ¤ | ◎ | ◎ | ◇ |
| 24 | Other failures (auxiliary supply failure and inverter failure) | | ◎ | ◎ | ◎ | ◎ | ◎ | ● | ◎ | ◎ | ◎ | ◎ | ◇ |
| Note: ○: off; ●: on; ¤: flashes; ◎: ensures according to the current operation mode of the UPS; ◇: alarm lasting; ☐: alarm; when the UPS is in the event of the normal mode, the UTILITY indicator and INVERTER indicator are on | | | | | | | | | | | | | |

**Note**

Indicator 5 is yellow, indicator 6 is red and other indicators are green.

# Chapter 4 Operation Instructions

This chapter describes UPS check before power-on, and the UPS power-on, turning on and routine operation procedures.

**Note**

1. If the UPS is fed from an AC generator, follow the following instructions to switch on the UPS: Start up the generator (without switching on the loads), then connect the UPS to the generator. When the generator operates stably, switch on the loads one by one. To ensure reliable generator operation, it is recommended that the UPS load be less than 30% of the generator capacity. It is recommended that the generator capacity be 1.5 times ~ 2 times of UPS rated capacity.

2. The battery has been fully charged before delivery. However, storage and transportation will inevitably cause some charge loss. Therefore, it is required to charge the battery for eight hours before putting the UPS into operation, so as to ensure adequate battery autonomy.

## 4.1 Check Before Power-On

Before power-on, check the following:

1. Check that the input cables and output cables are connected properly and reliably, and the input cable connections are not reverse.

2. Check that the battery poles are connected properly.

3. Check that the communication cables are connected properly.

## 4.2 UPS Power-On

After connecting the UPS input cables and output cables, start up the UPS if the mains input voltage is 120Vac ~ 253Vac, and the UPS conducts self-test (including battery self-test). When the UPS self-test is complete, the UPS enters the standby state and the UTILITY indicator turns on, as shown in Figure 4-1.

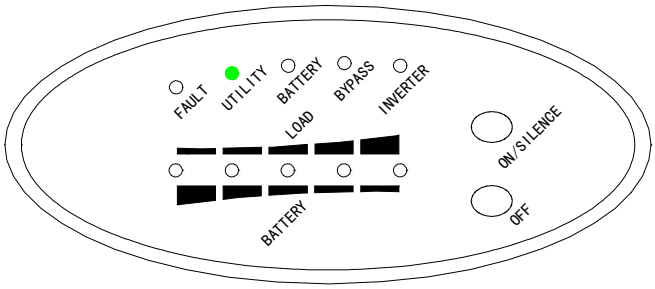



*Figure 4-1 Indicator displaying during UPS power-on*

## 4.3 Turning On UPS

After UPS power-up, press and hold the **ON/SILENCE** key for more than one second. After 30 seconds, the UPS will switch to mains inverter standby mode automatically and the INVERTER indicator will blink. When the UPS has output, the INVERTER indicator will turn on, as shown in Figure 4-2.

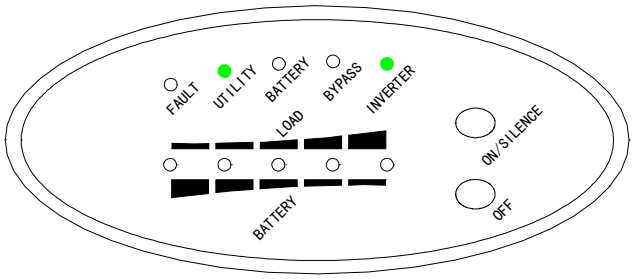



*Figure 4-2 Indicator displaying during UPS turning on*

Pressing the **OFF** key for 1s to confirm the UPS is in the bypass mode, the interface is shown in Figure 4-3.

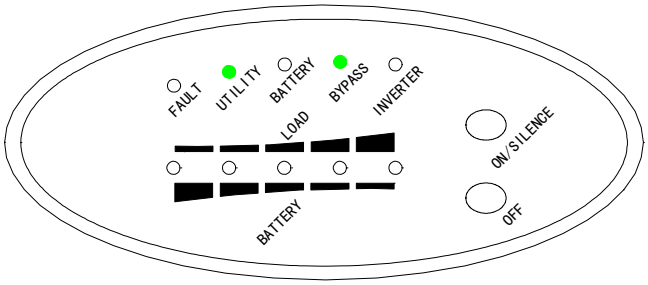



*Figure 4-3 Bypass mode*

It is recommended that load be less than 70% of the rated load, so as to ensure normal operation of the UPS in the event of short time extra-load, and prolong the lifetime of the UPS at the same time.

**Note**

If the UPS switches from Normal mode to Bypass mode three times within one hour due to overload, it will remain in Bypass mode for one hour afterwards and cannot switch back to Normal mode till the overload fault is removed.

## 4.4 Battery Self-Test

Battery self-test includes battery power-on self-test, battery manual self-test and battery periodic self-test.

### 4.4.1 Battery Power-On Self-Test

To ensure normal battery connection, the UPS will conduct self-test for the battery connection each time the UPS is powered-on. If the battery is not connected, reverse-connected or abnormal, the FAULT indicator will turn on and the BATTERY indicator will blink to remind you to inspect the battery connection. At this moment, the UPS cannot start up. After the battery connection fault is removed, press and hold the **ON/SILENCE** key for four seconds, and the indicators states are shown in Figure 4-4. If the battery voltage is too high, only the BATTERY indicator will blink.

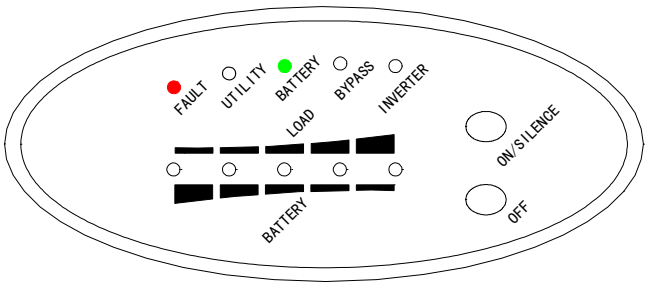



*Figure 4-4 Battery power-on self-test*

### 4.4.2 Battery Manual Self-Test

Battery manual self-test includes battery in-position test and battery state test.

Press and hold the **ON/SILENCE** key for four seconds, the battery self-test will begin and the BATTERY indicator will turn on, under the precondition that:

The UPS is in Normal mode

The mains is normal

Rectifier output is not overloaded

Battery voltage is not lower than 12V

After the self-test, the BATTERY indicator will turn off. Upon battery fault (battery not connected or failed), the FAULT indicator will turn on and BATTERY indicator will blink, as shown in Figure 4-5.

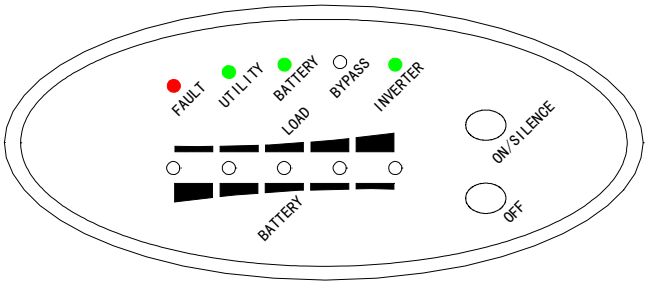



*Figure 4-5 Battery manual self-test*

### 4.4.3 Battery Periodic Self-Test

You can set self-test period of the battery through the monitoring software, which includes disabled, 3-month, 6-month, 9-month and 12-month.

The UPS will conduct periodic self-test according to the set self-test period, under the precondition that:

The UPS is in normal mode

The mains input is over 176Vac

The rectifier is normal

The single cell voltage is not lower than 12V

When the battery initiates periodic self-test, the BATTERY indicator will turn on. Upon battery non-connected or failed during battery periodic self-test, the FAULT indicator will turn on and the BATTERY indicator will blink, as shown in Figure 4-5.

**Note**

1. After every battery self-test, the UPS will refresh battery state information. Upon battery fault due to battery being under-charged, the UPS can confirm information through self-test after battery is fully charged.
2. Operation procedures: power-on battery, power-on mains and press the **ON/SILENCE** key.

## 4.5 Turning Off UPS

Turning off UPS includes turning off UPS from Normal mode, turning off UPS from Battery mode and turning off UPS from Bypass mode.

**Turning off UPS from Normal mode**

When the UPS is operating in Normal mode, press and hold the **OFF** key for one second until the buzzer beeps. At this point, the inverter turns off, the UPS transfers to Bypass mode, the UTILITY indicator and BYPASS indicator turn on. After the UPS transfers to Bypass mode, press and hold the **OFF** key for ten seconds, the UPS accesses to standby state. At this point, the UPS is not powered off completely and the UTILITY indicator flashes, as shown in Figure 4-6. If you wish to power off the UPS completely, you need to open the mains switch.

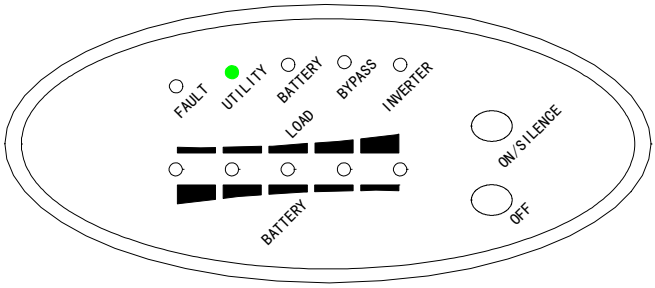



*Figure 4-6 Indicator displaying during UPS turning off*

**Turning off UPS from Battery mode**

When the UPS is operating in Battery mode, press and hold the **OFF** key for one second. At this point, the UPS turns off, the UPS ceases output, the load is powered off, the UPS is not powered off completely and the BATTERY indicator flashes, as shown in Figure 4-7. If you wish to power off the UPS completely, you need to press and hold the **OFF** key for ten seconds.

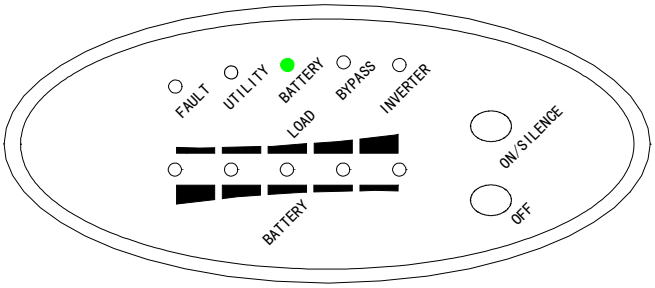



*Figure 4-7 Indicator displaying during Battery mode*

**Turning off UPS from Bypass mode**

Press and hold the **OFF** key for one second, the UPS in Bypass mode will cease output and enter the standby state. However, the UPS is not powered off completely then. If you wish to power off the UPS completely, you need to open the mains switch.

## 4.6 UPS Power-Off

The method is as follows:

1. Disconnect input cable plug or open the UPS front-level switch after powering off the UPS. At this point, all indicators will turn off, the fan will stop (if the UPS is configured with a battery, the fan will stop 20 seconds later), and the power-off is complete.

2. Place the external switch to the OFF position if the UPS has an external battery.

After powering off the UPS, the UPS ceases output and the load is powered off.

## 4.7 Transferring UPS Between Operation Modes

In normal state, set the UPS to Normal mode. In the event of mains failure, the UPS will switch to Battery mode automatically and will not cease output. In the event of overload, the UPS will switch to Bypass mode and will not cease output. In the event of inverter fault and over-temperature in the UPS, the UPS will switch to work at fault state automatically.

### 4.7.1 Transferring UPS From Overload Protection To Bypass Mode

In the event of UPS load outside rated value and preset time, the UPS will switch to Bypass mode from Normal mode and send alarm rapidly (once per 0.5 second). At this point, the UPS outputs mains voltage, the alarm is not canceled till the extra load is removed. Five minutes later, the output will switch back to Normal mode automatically.

To protect the load and UPS, the time that the UPS switches from Normal mode to Bypass mode is not more than three within one hour due to overload. If more than three times, it will remain in Bypass mode and cannot switch back to Normal mode till one hour later.

### 4.7.2 Transferring UPS From Mains Failure To Battery mode

In the event of mains failure, the UPS will switch to Battery mode. If the UPS has been working till the battery is exhausted, the UPS will be shut down automatically. When the mains is normal, the UPS restarts automatically and switches to Normal mode. This restarting function is designed for unattended operation. If the UPS is shut down manually during battery state operation, the UPS should be restarted manually when the mains resumes.

### 4.7.3 Transferring UPS From Inner Overheating Protection To Bypass Mode

Keep proper ambient temperature and favorable ventilation for the UPS. Otherwise, the UPS internal temperature will rise. At this point, the UPS will switch to Bypass, the FAULT indicator will turn on, indicator 3 will blink (see Figure 3-1) and the UPS will keep beeping. You should cut off the UPS input supply, remove the obstacle at the air duct or increase the clearance between the UPS and the wall. After the UPS is cooled, re-connect it to the mains and restart it.

### 4.7.4 Transferring UPS From Output Short Protection To Fault State

If the load is shorted, the UPS will cease output, the FAULT indicator will turn on, the LOAD indicator will blink and the UPS will keep beeping. At this point, you should disconnect the shorting load from the UPS, cut off the input power supply and wait for 10 minutes until the UPS is shut down automatically (you also can shut down the UPS by pressing the **OFF** key after ten seconds). After removing the shorting fault, the UPS can be re-connected to the mains and be restarted.

## 4.8 UPS Monitoring

For UPS monitoring methods, refer to SiteMonitor software delivered with the UPS.

# Chapter 5 Maintenance And Troubleshooting

This chapter deals with UPS maintenance, battery maintenance, UPS cleaning, state check, function check and troubleshooting.

To keep the UPS at optimum performance, the UPS operation environment should meet the product specifications.

## 5.1 Fan Maintenance

The UPS fans are expected to run for 20000 hours ~ 40000 hours continuously. The higher the ambient temperature, the shorter the fan life. During UPS operation, please verify the fan status once half year by confirming that air blows out from inside the air outlet on the rear panel.

## 5.2 Battery Maintenance

The internal battery of the UPS is sealed, lead-acid, maintenance-free battery. The battery life depends on the ambient temperature, charge and discharge times. High ambient temperature and deep discharge shortens battery life.

To ensure the battery life, it is required to

- Keep the ambient temperature between 15°C and 25°C.
- Prevent small current discharge. Continuous battery discharge time exceeding 24 hours is strictly prohibited.
- Charge the battery for at least 12 hours, if the battery hasn't been charged for three months at specified ambient temperature, or two months at high ambient temperature.

**Note**

1. Never short circuit the battery terminals, which will result in fire.

2. Never open the battery, as the electrolyte is harmful to human body. In the event of inadvertent contact of the electrolyte, wash the affected area immediately with plenty of clean water and go to see the doctor.

## 5.3 Cleaning UPS

Clean the UPS periodically, especially the ventilation holes, to ensure free airflow inside the UPS. If necessary, clean the UPS with a vacuum cleaner. Confirm that the ventilation holes are unobstructed.

## 5.4 Checking UPS State

It is recommended to check the UPS operation status once every half year.

1. Check if the UPS is faulty: Is the FAULT indicator on? Is the UPS giving any alarm?

2. Check if the UPS is operating in Bypass mode: Normally, the UPS operates in Normal mode; if it is operating in Bypass mode, find out the reason, for instance: is it because of operator intervention, overload, internal fault, and so on.

3. Check if the battery is discharging: When the AC mains is normal, the battery should not discharge; if the UPS is operating in Battery mode, find out the reason, for instance: is it because of mains failure, battery test, operator intervention, and so on.

## 5.5 Checking UPS Functions

**Note**

UPS function check procedures may cause power interruption to load!

It is recommended to check the UPS functions once every half year.

Backup the load data, before conducting the UPS functions check. Procedures are as follows:

1. Press the **OFF** key to check if the buzzer beeps, indicators are on and the LCD display is normal.

2. Press the **ON/SILENCE** key to check again if the indicators are on, the LCD display is normal and the UPS transfers to Inverter mode.

3. Press the **ON/SILENCE** key for 4s after Inverter mode, the UPS should initiate battery self-test. Check if the battery is normal. If not, find out the problem and solve it.

## 5.6 Troubleshooting

In the event of a UPS fault, shoot the trouble in the first instance following the instructions provides in Table 5-1. If the fault persists, seek technical assistance from the local service center of Emerson.

*Table 5-1 Troubleshooting table*

| No. | Fault | Possible cause | Action to take |
|---|---|---|---|
| 1 | The mains switch is closed, but the UPS provides no display on the operation and display panel, and the UPS does not conduct self-test | Main supply not connected to the UPS | Check that the UPS input cables are connected properly |
| | | Input voltage too low | Use a voltmeter to confirm that the UPS input voltage is within specifications |
| 2 | Mains supply is normal, but the UTILTITY indicator is off, and the UPS is in Battery mode | UPS mains switch open | Close the UPS mains switch |
| | | Input cables improperly connected | Connect the UPS input cables properly |
| 3 | No UPS alarm, but no UPS output voltage | Output cables improperly connected | Make sure the output cables are properly connected |
| 4 | After pressing the **ON/SILENCE** key, the UPS does not start | The key holding time is too short | Press and hold the **ON/SILENCE** key for more than one second till the buzzer beeps |
| | | Overload | Remove all load and restart the UPS |
| 5 | The UTILITY indicator flashes | Mains voltage output or frequency side specifications | If the UPS is operating in Battery mode, pay attention to the battery backup time |
| 6 | The buzzer beeps every 0.5 second, and the LCD displays OVERLOAD | Overload | Rectifier is overload or mains voltage is over. Need to remove non-priority load |
| 7 | The FAULT indicator illuminates, the LCD displays BATTERY FAL, and the BATTERY indicator flashes | External battery breaker open | Close the external battery breaker |
| | | External battery cables improperly connected | Check that the external battery cables are properly connected |
| | | External battery polarity reversed | Check that the external battery cables are not reverse-connected |
| | | Battery damaged | Contact the local service center of Emerson to replace the battery |
| 8 | The FAULT indicator illuminates, and the LCD displays CHARGER FAIL | Charger failed | Contact the local service center of Emerson to replace or repair the charger |
| 9 | The UPS has reduced battery time | Battery not fully charged | When the mains power is normal, charge the battery for more than 8hrs, and then test the battery discharge time |
| | | Battery not able to hold a full charge due to age | Contact the local service center of Emerson to replace the battery |
| 10 | The buzzer beeps, the FAULT indicator illuminates, and the LCD displays TEMP OVER | Internal over-temperature/fan fault | 1. Check that fan is unobstructed and air blows out from the air outlet on the rear panel.<br>2. Check that the clearances on both sides and at the back of the UPS are greater than 200mm.<br>3. Check that the ventilation holes on the front panel, side panels, base plate and rear panel of the UPS are unobstructed.<br>4. Wait for ten minutes and restart the UPS |
| 11 | The buzzer beeps for a long time, the FAULT indicator illuminates, and the LCD displays OUTPUT SHORT | UPS output short circuit | Remove the output short circuit fault and restart the UPS |

| No. | Fault | Possible cause | Action to take |
|---|---|---|---|
| 12 | The buzzer beeps for a long time, the FAULT indicator illuminates, and the LCD displays RECTIFIER FAIL, INVERTER FAIL, AUX SUPPLY FAIL, or OUTPUT FAIL | UPS internal fault | The UPS needs repair. Seek technical assistance from the local service center of Emerson. |
| 13 | Abnormal noise or smell in UPS | UPS internal fault | Turn off the UPS and cut off the power input immediately. Seek technical assistance from the local service center of Emerson |
| 14 | Yellow indicator illuminates and the buzzer beeps for a long time in Battery mode. The LCD displays BATTERY LOW TO BE SHUTDOWN | Battery voltage is low, the UPS is about to shut down, and cease feeding the load | 1. Save the load data immediately and turn off the load, to avoid data loss or damage. Or,<br>2. Connect backup AC power to the UPS input |
| 15 | The FAULT indicator illuminates, and the buzzer beeps for a long time | The parallel address is wrong | 1. Turn on the UPS mains switch. 2. Reset the parallel address |

When reporting UPS fault to Emerson or dealer, please inform the UPS model and machine No. (the bar code on the rear panel of the UPS). If the UPS is extended UPS, you also should provide battery configuration information.

## 5.7 Technical Support

Technical support is available by email and telephone:

**Asia pacific (Excluding China)**

Email: UPStech@emersonnetworkpower.com

Telephone:

- Australia: 1-800-147704
  Malaysia: 1800-EMERSON
- New Zealand: 0-800-447415
- Philippines: 1-800-10-EMERSON
- Singapore: 1-800-3637766
- Other regions: +632-636-8561

Emerson Network Power Asia Pacific Headquarters

Address: 7/F, Dah Sing Financial Centre, 108 Gloucester Road, Hong Kong

Homepage: www.emersonnetworkpower-partner.com

**China**

E-mail: service@emersonnetwork.com.cn

Telephone: 4008876510

Emerson Network Power Co., Ltd.

Address: No.1 Kefa Rd., Science & Industry Park, Nanshan District 518057, Shenzhen China

Homepage: www.emersonnetworkpower.com.cn

**Information you need to provide**

When you contact us, please have the following information ready beforehand:

- Product model number, serial number, and date of purchase.
- Your computer configuration, including operating system, revision level, expansion cards, and software.
- Any error messages displayed at the time the error occurred.
- The sequence of operations that led up to the error.
- Any other information you feel may be of help.

# Appendix 1 Battery Module

**Appearance**

The protective panel has been installed at the factory to avoid the damage to the battery module during the transportation. Remove the six screws to take off the protective panel.

The standard UPS has a battery module. The appearance of the battery module is shown in Figure 1.

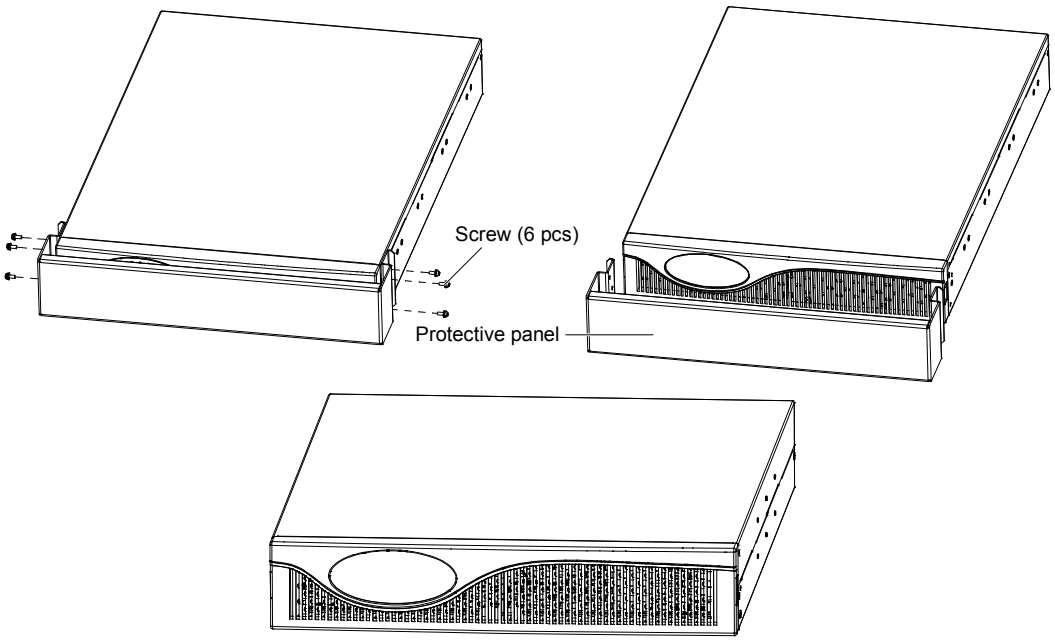



*Figure 1 Battery module*

**Rear panel**

Operation panel on the front panel of the battery module is not available.

The battery module provides battery ports, battery fuse box and ventilation holes on the rear panel, as shown in Figure 2.

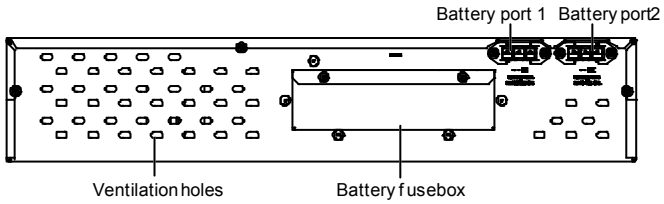



*Figure 2 Rear panel of the battery module*

**Replacing battery fuse**

If the battery internal fuse is damaged, loosen the protective cover on the rear panel of the battery module and replace the damaged fuse with a new one, then tighten the fixing screws of the protective cover to prevent electric shock risk during the UPS operation, as shown in Figure 3.

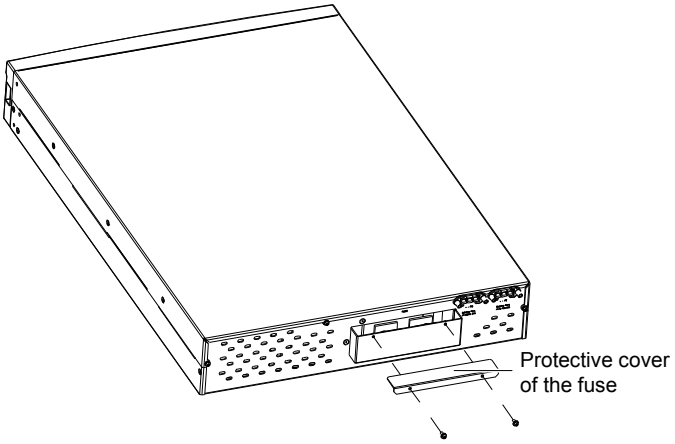



*Figure 3 Replacing fuse*

**Note**

1. Because battery loop and AC input are not insulated, a dangerous voltage may exist between the battery ports and ground, so it is prohibited to contact them, thus presenting electric risk.

2. The length of the standard battery cable delivered with the battery module is 0.5m. If user needs more length cable, please consult the dealer.

# Appendix 2 Communication Function

The UPS provides not only SNMP card but also dry contact, MODBUS card and other communication components. This chapter only introduces SNMP card. For the installation and use of the other communication components, refer to information delivered with each communication components.

The SNMP card realizes remote monitoring. For details, setting and use of the SNMP card, refer to *UPS Web/SNMP Agent Card User Manual*. The SNMP card ports and USB ports cannot be used at the same time.

The layout of pins for the SNMP card ports is shown in Figure 4.

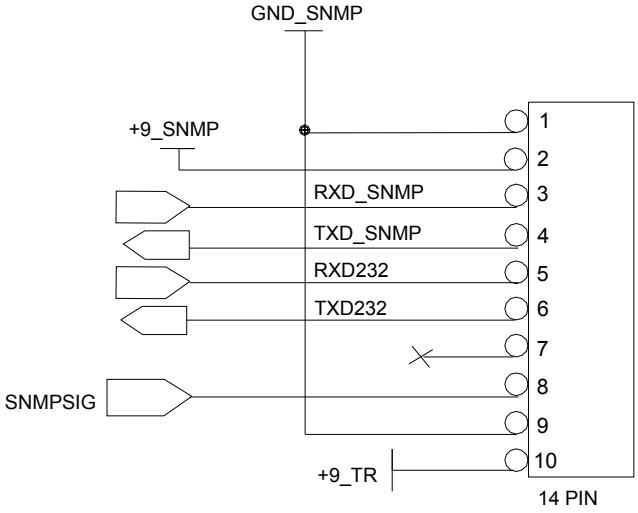



*Figure 4 Layout of pins for the SNMP card ports*

Definition of the pins for the SNMP card ports:

Pin 1 and pin 9: power ground of the SNMP card

Pin 2: supplied to SNMP card by DSP plate

Pin 3: signal from the SNMP card, connected to RXD of the DSP plate

Pin 4: signal to the SNMP card, connected to TXD of the DSP plate

Pin 5: connected to RX of the RS232 communication port of the host

Pin 6: connected to TX of the RS232 communication port of the host

Pin 7: reserved

Pin 8: card gating signal, connected to +9_TR after inserting SNMP card

Pin 10: supplied by DSP plate, used to card gating

# Appendix 3 LCD Operation And Display Panel

LCD operation and display panel is an optional. The installation and debugging had been finished before delivered. You cannot install and maintain it by yourself.

## 1. Brief Introduction

The LCD operation and display panel provides a LCD, indicators and control keys, as shown in Figure 5, which are used to display and control the following information: operation parameters, alarm information and function setup.

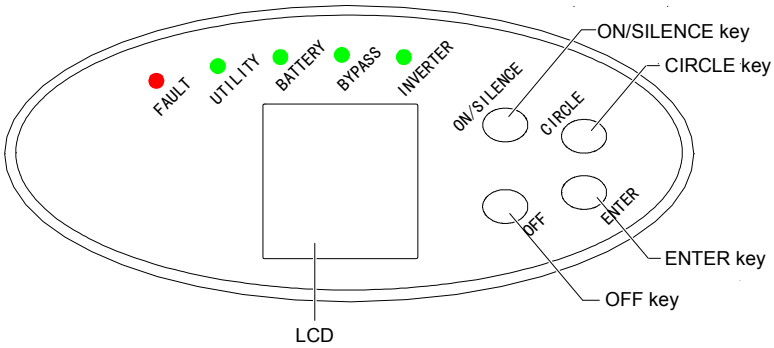



*Figure 5 LCD operation and display panel*

The LCD operation and display panel provides five indicators, a LCD and four control keys.

**Indicators**

The indicators include FAULT indicator, UTILITY indicator, BATTERY indicator, BYPASS indicator and INVERTER indicator, which indicate UPS operation and fault states. For details, refer to Table 3-2.

**LCD**

The resolution of the LCD is 128 × 128 dots. The Chinese character dot matrix is 16 × 16, English character, number character and small number dot matrix is 16 × 8. LCD uses together with the **CYCLE** and **ENTER** keys to provide the UPS running and alarm message and setting display interface.

**Control keys**

The LCD operation and display panel provides four control keys: **ON/SILENCE** key, **OFF** key, **CYCLE** key and **ENTER** key. Their functions are listed in Table 1.

*Table 1 Functions of the control keys*

| Control key | Function |
|---|---|
| ON/SILENCE key | 1. Starting inverter: When the inverter is off, pressing and holding this key for one second starts the inverter. 2. Silencing alarm: In Battery mode, upon overload or fault, the UPS has an audible alarm, pressing and holding this key for one second silences the alarm. 3. Initiating battery test: When the UPS is in Normal mode, pressing and holding this key for four seconds initiates battery test |
| OFF key | 1. Turning off inverter: When the UPS is in Normal mode or Battery mode, pressing and holding this key for one second turns off the inverter. 2. UPS accessing to standby state: When the UPS is in Bypass mode, pressing and holding this key for ten seconds turns off UPS bypass output, then the UPS accesses to standby state |
| CYCLE key | Pressing and holding this key for less than one second shifts between menu items on the same level and selects parameters. Pressing and holding this key for more than one second turns on/turns off the backlight on the LCD |
| ENTER key | Pressing and holding this key for less than one second opens the selected menu and confirming. Pressing and holding this key for more than one second returns to previous menu |

# 2. LCD Operation And Display Interface

The LCD provides the following interfaces including power-on self-test interface and menu operation interface.

**Power-on self-test interface**

Power-on self-test interface is used to display the product series, type and company name for about 20 seconds, as shown in Figure 6. The definitions of the control keys in this interface are listed in Table 2.

*Figure 6 Power-on self-test interface*

*Table 2 Definitions of the control keys in the power-on self-test interface*

| Control key | Definition |
|---|---|
| ON/SILENCE key | Pressing and holding this key for one second starts the inverter |
| OFF key | No response |
| CYCLE key | Pressing and holding this key for more than one second turns on the backlight on the LCD |
| ENTER key | No response |

**Menu operation interface**

The menu operation interface includes running interface, alarm message interface and setting interface.

The definitions of each level menu are listed in Table 3. You can enter the corresponding interfaces through the control keys on the LCD operation and display panel, the interfaces are refreshed once 1s.

*Table 3 Sub-menu*

| Main menu | Level-1 menu | Level-2 menu | Level-3 menu | Level-4 menu |
|---|---|---|---|---|
| UPS1#<br>UPS2#<br>UPS3#<br>UPS4#<br>System information | Running | Input | Input voltage | Phase-A |
| | | | | Phase-B (No display when input is single-phase) |
| | | | | Phase-C (No display when input is single-phase) |
| | | | Frequency | |
| | | Battery | Battery voltage | |
| | | | Battery capacity | |
| | | Bypass | Bypass voltage | |
| | | Output | Output voltage | |
| | | | Output current | |
| | | | Output frequency | |
| | | | Active power | |
| | | | Apparent output | |
| | | | Load factor | |
| | | Return | | |
| | Setting | System | EOD Startup | Enabled (default), disabled |
| | | | ECO function | Enabled (default), disabled |
| | | | Capacity | 6kVA |
| | | | Self-test cycle | Disabled (default), 3-month, 6-month, 9-month, 12-month |
| | | LCD | Installation mode | Horizontal (default), vertical |
| | | | Language | Chinese (default), English |
| | | Resume default | Resume default | |
| | | Return | | |
| | Alarm message | | Inverter asynchrony | |
| | | | Inverter failure | |
| | | | Rectifier failure | |
| | | | Abnormal bus voltage | |

| Main menu | Level-1 menu | Level-2 menu | Level-3 menu | Level-4 menu |
|---|---|---|---|---|
| UPS1#<br>UPS2#<br>UPS3#<br>UPS4#<br>System information | Alarm message | | Abnormal input | |
| | | | Abnormal bypass | |
| | | | Battery discharge end | |
| | | | Battery fault | |
| | | | Output overload | |
| | | | Output short | |
| | | | Charger failure | |
| | | | Over-temperature for radiator | |
| | | | Fan fault | |
| | | | auxiliary supply failure | |
| | | | Input neutral line in disconnected | |
| | | | Parallel line fault | |
| | | | Current sharing fault | |
| | | | Parallel address conflict | |
| | | | Module communication fault | |
| | Return | | | |

The contents displayed in the parallel menu are shown in Figure 7. “LOCAL” is the current DIP address, “ABSENT” indicates that the UPS on the address is not connected to the parallel system, “SYSTEM” is the output parameters of the parallel system. The definitions of the control keys in this parallel interface are listed in Table 4. When the UPS works in single mode, there is no main menu.

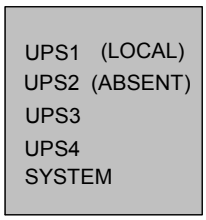
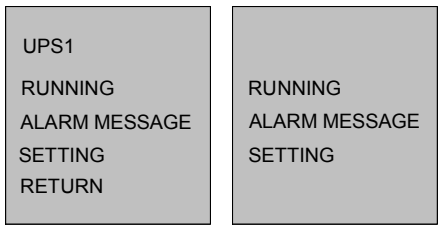



*Figure 7 Parallel menu interface*

*Table 4 Definitions of the control keys in the parallel menu interface*

| Control key | Definition |
|---|---|
| CYCLE key | Pressing and holding this key for less than one second cycles display the selected content in high-light. Pressing and holding this key for more than one second turns on/turns off the backlight on the LCD |
| ENTER key | Pressing and holding this key for less than one second enters the corresponding menu or system |

If the system is parallel, select the “UPS (LOCAL)”, press and hold the **ENTER** key for less than one second to enter the level-1 menu. The displayed contents are shown in Figure 8(a). Select other UPSs, press and hold the **ENTER** key for less than one second to enter the level-2 menu of the running parameters (the alarm messages of other UPSs are not be displayed and the setting is invalid). If the UPS is single, enter the level-1 menu directly and the displayed contents are shown in Figure 8(b). The definitions of the control keys in this interface are listed in Table 5.



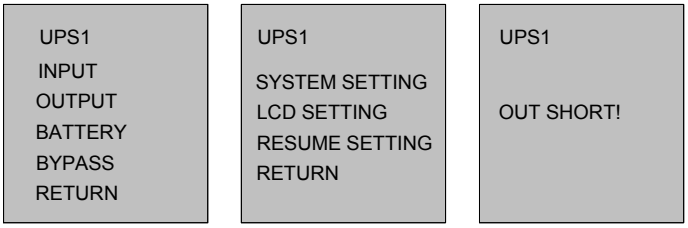

*(a)* *(b)*

*Figure 8 Level-1 menu interface*

*Table 5 Definitions of the control keys in level-1 menu interface*

| Control key | Definition |
|---|---|
| CYCLE key | Pressing and holding this key for less than one second cycles display the selected content in high-light. Pressing and holding this key for more than one second turns on/turns off the backlight on the LCD |
| ENTER key | Pressing and holding this key for less than one second enters the selected menu. Pressing and holding this key for more than one second returns to the parallel menu, there is no response when the UPS is single |

The contents displayed in level-2 menu are shown in Figure 9 if the UPSs are parallel. The displayed contents are the same except the UPS address. The definitions of the control keys in this interface are listed in Table 6.




*Running interface* *Setting interface* *Alarm message interface*

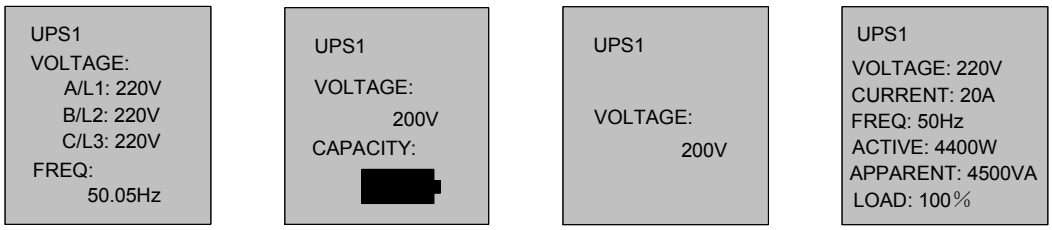
*Figure 9 Level-2 menu interface*

*Table 6 Definitions of the control keys in the level-2 menu interface*

| Control key | Response relation |
|---|---|
| CYCLE key | Pressing and holding this key for less than one second cycles display the selected content in high-light. Pressing and holding this key for more than one second turns on/turns off the backlight on the LCD |
| ENTER key | Pressing and holding this key for less than one second enters the selected menu. Pressing and holding this key for more than one second returns to the previous menu |

The contents displayed in level-3 menu include the specific contents of the running parameters, setting parameters and alarm messages.

The contents displayed in running parameter interface are shown in Figure 10 if the UPS is parallel, the contents are not displayed when the UPS is single, and others are the same. The definitions of the control keys in this interface are listed in Table 7.



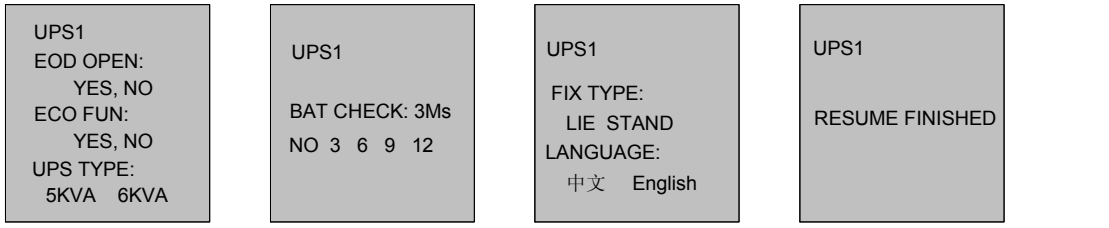

*Input parameter interface* *battery parameter interface* *Bypass parameter interface* *Output parameter interface*

*Figure 10 Level-3 and level-4 menu of running parameter interface*

*Table 7 Definitions of the control keys in the running parameter interface*

| Control key | Definition |
|---|---|
| CYCLE key | Pressing and holding this key for less than one second: no response; Pressing and holding this key for more than one second turns on/turns off the backlight on the LCD |
| ENTER key | Pressing and holding this key for less than one second returns to the level-2 menu. Pressing and holding this key for more than one second returns to the previous menu |

The contents displayed in setting parameter interface are shown in Figure 11. The definitions of the control keys in this interface are listed in Table 8.




*Setting interface 1* *Setting interface 2* *LCD setting interface* *Resume factory parameter interface*

*Figure 11 Parameter setup interface*

*Table 8 Definitions of the control keys in the parameter setup interface*

| Control key | Definition |
|---|---|
| CYCLE key | Pressing and holding this key for less than one second cycles display the selected items in high-light. Pressing and holding this key for more than one second turns on/turns off the backlight on the LCD |
| ENTER key | Pressing and holding this key for less than one second enters the selected items. Pressing and holding this key for more than one second returns to the previous menu |

The contents displayed in alarm message interface are shown in Figure 12.

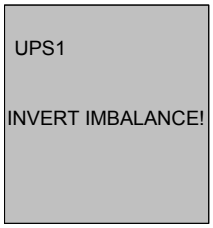



*Figure 12 Alarm interface*

The alarm message interface real time displays the current alarm information of the UPS for one minute for 20s and return automatically to the alarm message interface. The specific alarm message can be displayed in the level-1 menu. The definitions of the control keys in this interface are listed in Table 9.

*Table 9 Definitions of the control keys in the alarm message interface*

| Control key | Definition |
|---|---|
| CYCLE key | Pressing and holding this key for less than one second: no response. Pressing and holding this key for more than one second turns on/turns off the backlight on the LCD |
| ENTER key | Returns to the previous menu |

# Appendix 4 POD

UPS parallel output power distribution unit (POD for short) includes single-phase input single-phase output 1 +1 POD, single-phase input single-phase output 3 + 1 POD and 3-phase input single-phase output 3 + 1 POD.

This chapter introduces the appearances and ports of the three PODs.

## 1. Single-Phase Input Single-Phase Output 1 + 1 POD

The appearance of the single-phase input single-phase output 1 + 1 POD is show in Figure 13.

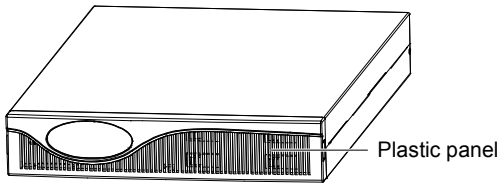



*Figure 13 Single-phase input single-phase output 1 + 1 POD*

Remove the plastic panel, you can access the operation panel of the single-phase input single-phase output 1 + 1 POD, as shown in Figure 14.

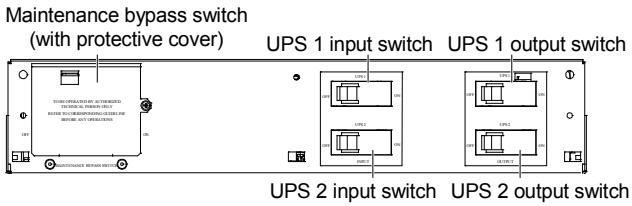



*Figure 14 Operation panel of the single-phase input single-phase output 1 + 1 POD*

The rear panel of the single-phase input single-phase output 1 + 1 POD is shown in Figure 15.

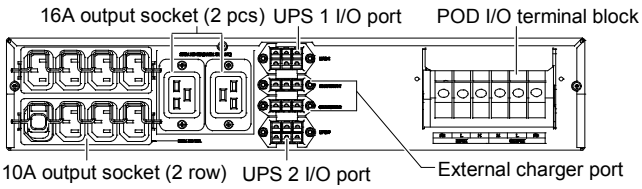



*Figure 15 Rear panel of the single-phase input single-phase output 1 + 1 POD*

## 2. Single-Phase Input Single-Phase Output 3 + 1 POD

The appearance of the single-phase input single-phase output 3 + 1 POD is shown in Figure 16.

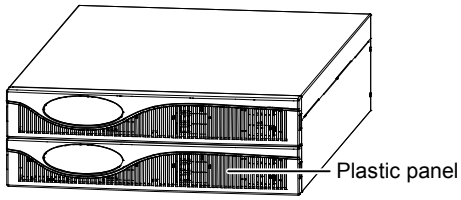



*Figure 16 Single-phase input single-phase output 3 + 1 POD*

Remove the plastic panel, you can access the operation panel of the single-phase input single-phase output 3 + 1 POD, as shown in Figure 17.

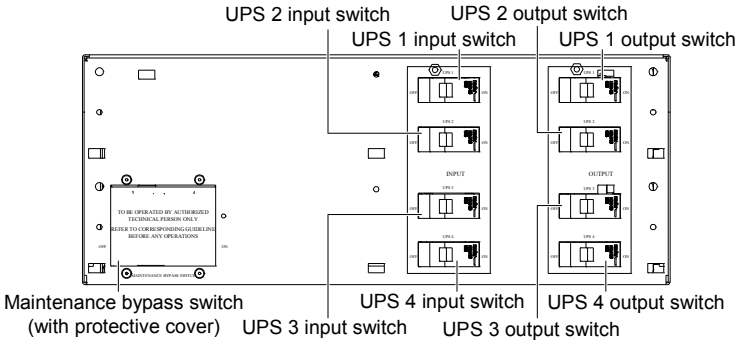



*Figure 17 Operation panel of the single-phase input single-phase output 3 + 1 POD*

The rear panel of the single-phase input single-phase output 3 + 1 POD is shown in Figure 18.

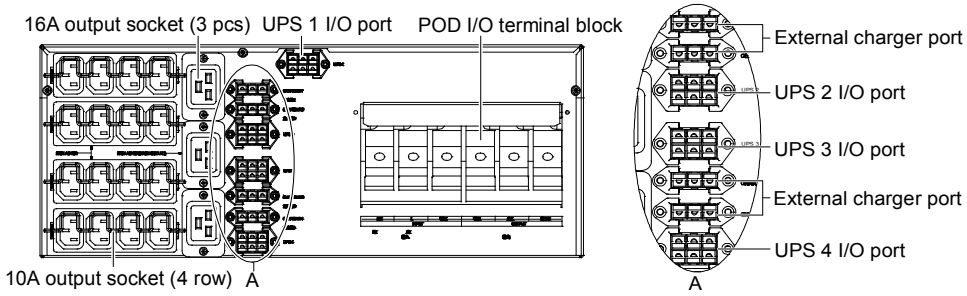



*Figure 18 Rear panel of the operation panel of the single-phase input single-phase output 3 + 1 POD*

# 3. 3-Phase Input Single-Phase Output 3 + 1 POD

The appearance of the 3-phase input single-phase output 3 + 1 POD is shown in Figure 19.

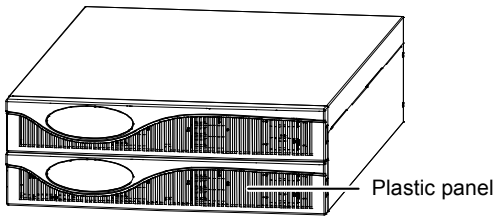



*Figure 19 3-phase input single-phase output 3 + 1 POD*

Remove the plastic panel, you can access the operation panel of the 3-phase input single-phase output 3 + 1 POD, as shown in Figure 20.

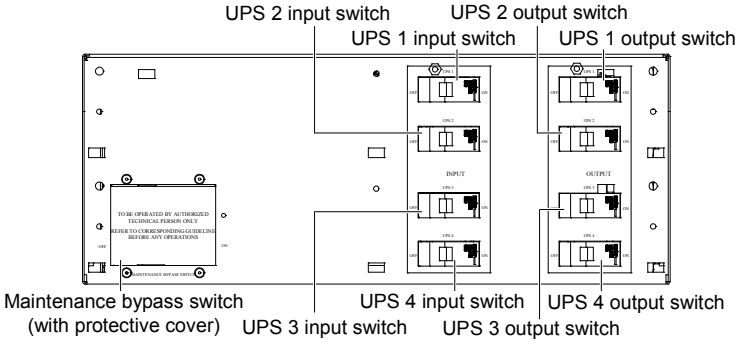



*Figure 20 Operation panel of the 3-phase input single-phase output 3 + 1 POD*

The rear panel of the 3-phase input single-phase output 3 + 1 POD is shown in Figure 21.

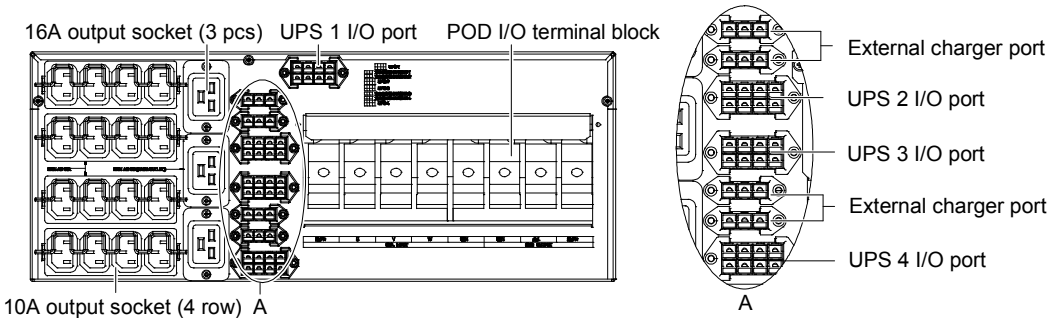



*Figure 21 Rear panel of the 3-phase input single-phase output 3 + 1 POD*

# Appendix 5 Optional Part List

The optional part list is given in Table 10.

*Table 10 Optional part list*

| Optional part | Type | Remark |
|---|---|---|
| Battery module | U16-07C1 | Standard configuration |
| | U20-24C2 | User needs to select a battery cabinet with two layers |
| | U20-38C3 | User needs to select a battery cabinet with three layers |
| | U20-65C3 | User needs to select a battery cabinet with three layers |
| | U20-100C3 | User needs to select a battery cabinet with three layers |
| Communication options | UFSN81Z1-UF-SNMP810 | SNMP card assembly used in Intellislot UPS - ROHS |
| | UFDRY32Z1-UF-DRY320 | Dry contact extended card used in UPS - {R5} |
| | UFDRY31Z1-UF-DRY310 | Dry contact card and its assembly usd in UPS - {R5} |
| | UFMOD11Z1-iTrust | MODBUS assembly used in UPS (UF-MODBUS110) - {R5} |
| POD | UF-POD314U31 | 3-phase input single-phase output rack model 6kVA UPS 3 + 1 POD - {R5} |
| | UF-POD112U | single-phase input single-phase output rack model 6kVA UPS 1 + 1 POD - {R5} |
| | UF-POD314U11 | single-phase input single-phase output rack model 6kVA UPS 3 + 1 POD - {R5} |
| Guide rail/rack | DMBM6.200.020 | |
| LCD unit | UH52SA1Z1 | |

The optional parts has been installed and debugged before delivery.